SCIENTIFIC AMERICAN

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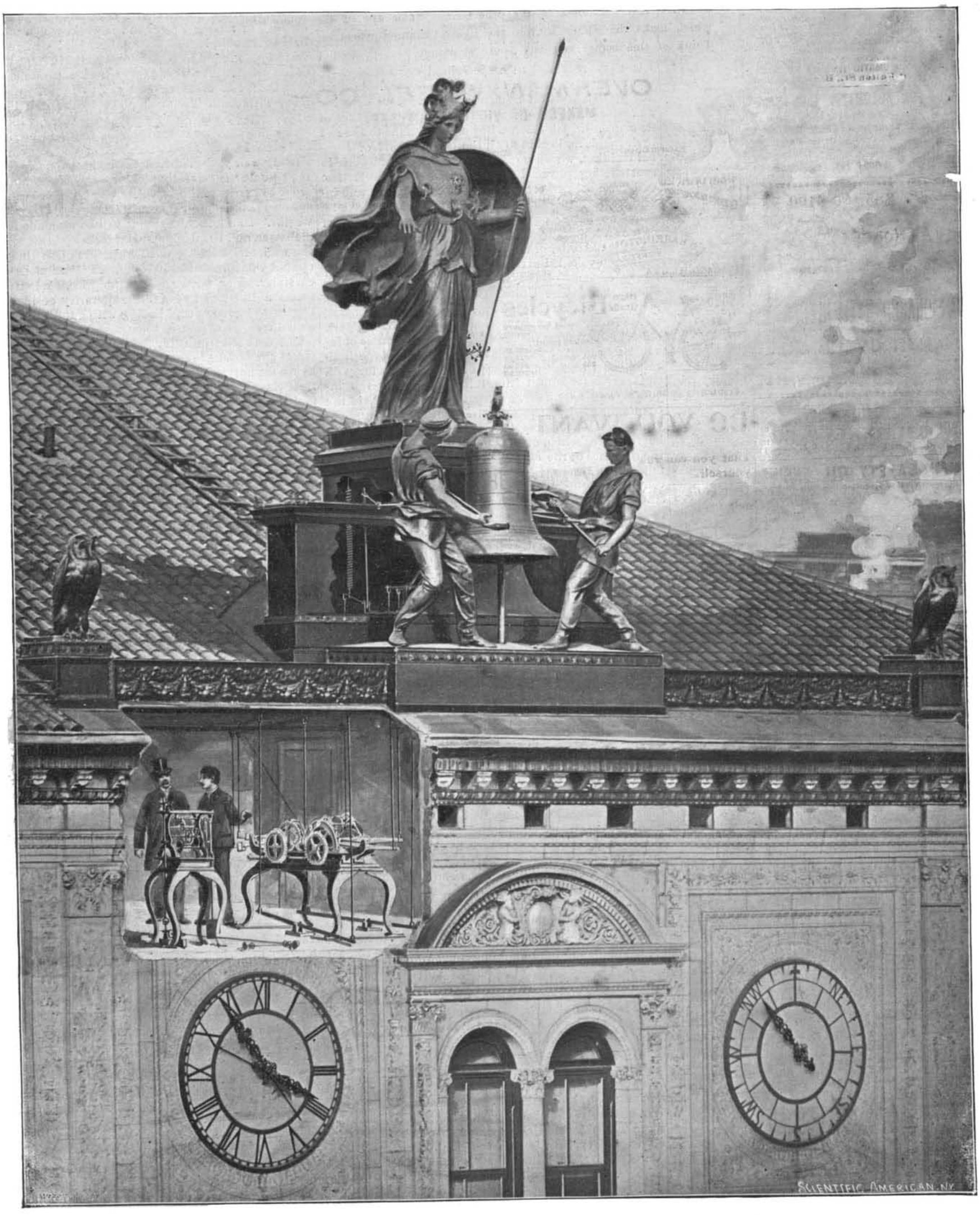

THE HERALD ESTABLISHMENT, NEW YORK—THE STATUE OF MINERVA, BELL GROUP AND CLOCK.—[See page 280.]

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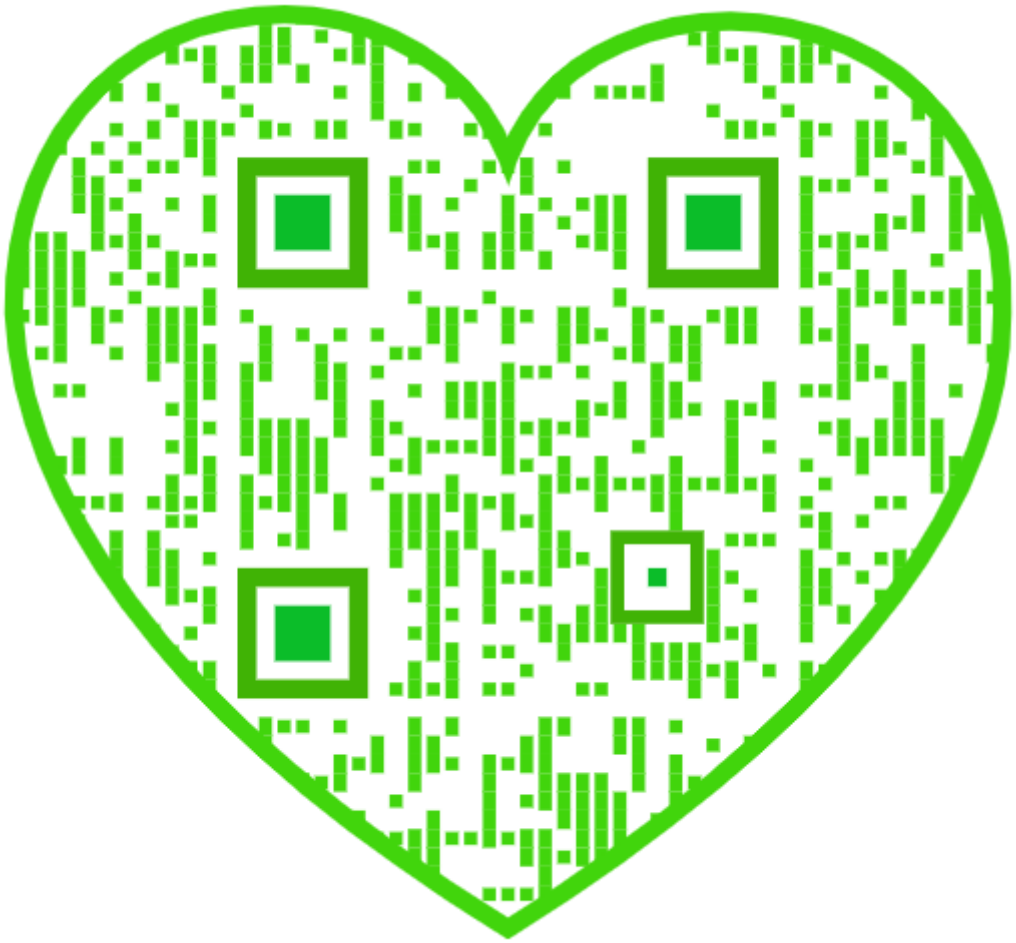

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THE ADVANCED SYSTEM OF EDUCATION.

The educational question is one which engages more attention every year. Formerly the teacher's art was supposed to consist in instilling into the pupil's mind the contents of books. Directly or indirectly, school education was book education. But now a change has come over the spirit of education, and manual training and cultivation of the spirit of observation have been erected into important elements of school work. We have frequently illustrated typical institutes where these advanced doctrines held sway, the Teachers' College, of this city, being the most recent presentation of the kind alluded to.

In considering the change in educational methods, a very curious point is met—what effect will the extensive introduction of manual and observational training have on the next generation in the realms of invention and science? Hitherto, by the outside world, the inventor has been regarded as the embodiment of distinct genius—even the highest courts have so spoken of him, however pronounced their minimizing tendency may be at present. The distinguished scientist is regarded as a specialized organization—as one adapted by nature for difficult research. Is there any probability that a school which teaches drawing and which keeps up the instruction for the years of its course—which teaches boy and girl alike the use of their hands and brain in all the departments of manual training, whose pupils execute individual work in constructing physical apparatus—is it probable that such a school will produce a series of scientists and inventors, or will the pupils, after all is done, leave its doors no better equipped than their predecessors of fifty or a hundred years ago?

In the old order of things there was a quality of ruggedness evoked in the successful man, perhaps at heavy expense of the weaker ones, which elicits our admiration. The United States has been prolific of men who, without any advantages, worked their way to the front, and, encountering obstacle after obstacle, only grew stronger with opposition. The annals of invention are full of veritable romances of the type indicated. Leaving aside the winners in the race for political preferment and taking into account only the inventor and scientist, we cannot but feel that, in the frequent asperity of the conditions of the lives and environments of the great workers of the age, there is to be found a school of differentiation adapted to bring the qualities of the strong into greater relief. Under milder conditions the strong might lack the very incentives supplied by the passive resistance of circumstance. But the weak would advance proportionately.

The new system of education, based on the concrete instead of the abstract, will be unquestionably a great advance and benefit to the country. There is for one with any bent for mechanics or science an absolute irritation in the insusceptibility to mechanical or scientific things so often to be found in the everyday world. Thousands of people are content to travel on steam or electric roads without knowing the least thing of the prime motor which propels the cars in which they ride.

Most astonishing examples of ignorance of things about us have been cited by students of education who have examined pupils of the old time system of schools. Tests have been applied by asking the dimensions of objects, with the strangest discrepancies in statement. But a child who has followed such a course as is given, for instance, in the public schools of Cleveland, will have a very strong idea of the relation of things. The annual report of the Board of Education of that city shows a remarkable development of work along the line of observation and manual practice. Examples of drawing executed in the different classes show that the lessons in the real things of life begin with the younger pupils. The illustrations show a whole class of children drawing from the life, some of their co-pupils serving as models. Numerous reproductions of the drawings by the pupils show a reasonable amount of success in what the educated artist finds a difficult task to do adequately. In the higher grades some really excellent work is shown.

The above report is merely cited as an embodiment of the modern theory of teaching the young. The change is not in the way of restraining genius—it is in the way of developing mediocrity. The worker in science who is great will still tower above the rest. The inventor will lose none of his fame. But the background will be a more pleasing one.

The new system will not produce an army of great investigators, but will raise the general level. The qualities required by the specialist must be implanted by nature. The object of the drawing lesson in the school is not to make artists, but to teach observation—the lesson given by the lathe is not so much in the mechanic's art as in the use of the hands and eyes. The object of manual training is at once easily understood and often misapprehended. The school employing it is not to have its success gaged by the number of successful carpenters or machinists among its graduates. It will prove its worth by the general results and the effects on the character of the pupils.

The independent scientist and inventor will be unaffected. They will still hold their pre-eminence and genius, as hitherto; will be unclipsed by educated mediocrity. The training of the average mind will simply give a better equipped and more appreciative audience for their achievements. The occasional accession to the ranks of inventors and discoverers which such schools may develop will be a service worth all the thought, time and trouble expended on the development of the advanced system of education.

Alabaster Mines.

Thirty-two miles to the southeast of Pisa, in the province of that name, a very remarkable and very ancient industry is carried on. We refer to the alabaster industry, of which a full description from actual observation is given by Vice-Consul Carmichael, of Leghorn, in a foreign post office report just issued. Volterra, where the alabaster is found, enjoys special distinction among places in the world which produce that commodity. The material, which is of five main varieties, is found in nodules embedded in huge masses of limestone. At the end of each cavern whence it is extracted, two or three men are to be seen working away with small T-shaped picks by the dim light of unprotected oil lamps of Etruscan pattern, which, by a singular tenacity of tradition, are still in use in the district. In one case the block of alabaster will be already well projected from its bed of limestone, and the operator is carefully picking away all around it in order to extricate the complete block. The larger the specimen, the more valuable it is in proportion to its weight. In another, search is still being made for the alabaster, and the workman is vigorously beating down the wall of limestone until he lights upon the white nose of what looks like a block. He then picks away carefully, so as not to injure the prize. When there seems a likelihood of a large quantity of limestone having to be removed, blasting with gunpowder is resorted to.

The alabaster industry dates back to classic times. Great changes have taken place in it, however, within living memory. In former days there were three distinct classes of workmen engaged in the work of fashioning the raw material—the master artist, who owned a workshop and employed numerous workers, selling his products direct to the alabaster shops or "galleries;" the journeymen and the travelers, men who took huge cases of the goods and sold them as they went along in all the countries of the world, civilized and uncivilized. Of these, two, the master worker and the traveler, are now extinct species. Nowadays, three men, usually relatives, work together in informal partnership, one being a turner, another a modeler, and the third a decorator, who carves such decorative adjuncts on the finished articles as fruit and flowers. Their gains are very small, and, indeed, travelers who put in at the port of Leghorn and have alabaster vases, statuary and the like offered at almost absurdly low prices refuse, as a rule, to believe that they can be made by hand. One kind of alabaster is made by a process of dyeing, which is still a trade secret, into an excellent imitation of coral. For a time this has had a very large sale, but the trade is now threatened with extinction.

Mushrooms and Manure Heaps.

As grown in old grass pastures, mushrooms are agreeable and excellent eating, especially if cooked properly and cooked fresh. Even as produced artificially for the market, they are often quite wholesome, if washed clean and cooked early. But, as is well known, says the Lancet (London), mushrooms belong to an order of vegetables of a somewhat low organization, and they grow and reproduce themselves with remarkable rapidity when sown in decomposing vegetable matter. Many growers take advantage of this fact to cultivate mushrooms on manure heaps—heaps, that is to say, not of ordinary farmyard manure, but of the vile and rotting filth of every description which is gathered together in large towns and delivered to suburban and country mushroom growers by horse wagon or train. Now, plants take up into themselves the very stuff, modified, on which they grow. Mushrooms grown on matter of this sort select from it those parts which they are able to assimilate. But the arrangement of the "cap" of the mushroom enables it also to absorb the vapor of the manure, which is a dangerous poison to man and other animals. Thus the scores or hundreds of radiating plates of which they principally consist are in practice little better than traps for the catching and retaining of more deadly poisons still.

Improved Paving.

The material consists of concrete made of small lumps of emery stone set in Portland cement. The emery may be in pieces varying from half an inch in diameter down to a powder, and is mixed with Portland cement in the proportion of three parts of emery to two of cement. The composition prepared in this way is used to face ordinary concrete slabs, constituting a wearing surface for paving flags, steps, etc.

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The Durability of Pigments Derived from Coal Tar Products.

A paper on this subject was recently read before the Society of Chemical Industry, London, by A. P. Laurie, M.A., who said, the method has been to grind a little of the pigment into a stiff paste with water, and then to dilute with more water and a few drops of a strong solution of pure gum arabic. This dilution was practically the same in each case, and was so adjusted that, on stirring up the diluted pigment, which was kept in a corked bottle, and then laying on a wash with a soft camel hair brush, I should get a tint of the depth required. These washes of color were laid upon Whatman paper in five coats, each coat covering less of the surface than the one laid on before, so that at the end, on the top of my strip of paper, I had a layer of color five coats thick, and a series of coats lying in steps down the paper, till at the bottom I had only one coat of color. These washes were so regulated in strength that they were not so weak as to make one and two indistinct, and not so strong as to make five and four indistinct. In practice, I get in this way coats closely corresponding for different pigments in the strength of coloring effect that they represent, and while this is, of course, far from a perfect method, it yields results which are sufficiently good for practical purposes.

In practice I cut a little portion from the top of my washes of the pigments, and attached it with a piece of gum paper to a sheet of glass which was fixed to a window with a north exposure.

To summarize, I can say that alizarin and its derivatives and galloflavine form remarkably durable lakes; that some eosine lakes, naphthalene, scarlet, and erythrene come next; that after these comes crimson lake; that next to crimson lake comes acid green, while among the very fugitive colors we must place methylene blues, methyl violets, brilliant green, and some eosine lakes.

In some cases colors quickly change in tint, but do not necessarily fade rapidly. This is probably the worst fault a color can possibly have.

Mr. R. J. Friswell said it was impossible to draw an inference from the behavior of a particular dye when used in one way as to how it would behave when used in another. For instance, eosine, when dyed upon wool or cotton, was one of the most fugitive of the aniline colors, yet if it were precipitated on baryta or lead bases in the proper manner, it was one of the most permanent. As a manufacturer of dyes, he was interested in their permanence when applied to fabrics or yarns. He had come to the conclusion that no law could be laid down that a particular color was fugitive or non-fugitive sui generis. All experiments showed this to be absolutely impossible. The permanence of a color was a function of the color itself plus the substance with which it was combined. That was shown by the behavior of colors of the methyl violet, brilliant green, and malachite green series when dyed upon starch. The speaker instanced some tubes of starch dyed with one per cent of methyl violet and brilliant green. These tubes were prepared about ten years ago, and after being shown for months in an exhibition in East London, had been exposed to sun and light for years, but were still absolutely unchanged. Had wool or cotton been used, the color would have disappeared in a few months. To obtain reliable results, Mr. Laurie should obtain colors the genuineness of which could be certified, and should himself prepare the lakes to be experimented with. He would caution the author against being misled upon one point. If he dyed two parts of color upon 50 grammes of barium sulphate and then mixed it with another 50 grammes of barium sulphate undyed, and compared this with another 100 grammes dyed with two per cent, the two might, owing to the imperfection of human vision, appear to have the same tint. But as a matter of fact he would have double the amount of color undergoing the action of light in the one case, just as a double depth of solution gave double absorption in the spectrum of the colors. The slowness of some colors to fade might be accounted for by their producing dark-colored decomposition products on the surface, which had a protective action on the color beneath.

Powdered Zinc for Recovering Photo. Wastes.

Dr. Stiebel, of Frankfort, uses zinc in powder to get back the gold from toning baths. This agent renders excellent service for precipitating neutral or alkaline solutions, even when they have a slightly acid reaction. The excess of acid is better neutralized by the addition of alkali, otherwise it would be necessary to greatly increase the quantity of zinc powder necessary to weaken this acid, which is not the case when the solution is neutral or alkaline. Dr. Stiebel took for his experiments a solution of hyposulphite of soda of 1:5, which contained exactly per liter 1·0988 gr. of silver and 0·4648 gr. of gold; 250 cubic centimeters of this solution were treated with 2·5 gr. of zinc powder, which had previously been strongly agitated in pure water. The mixture was stirred with care. At the end of ten minutes, when the liquid had regained all its limpidity, the filtered solution, treated with sulphide of potash, showed no longer any black coloration, because it no longer contained silver.

In the precipitate, Dr. Stiebel found: 0·2715 gr. of silver = 98·84 per cent of the quantity calculated; 0·1150 gr. of gold = 98·97 per cent of the quantity calculated, that is to say, practically the entire quantity of the precions metal that had been used. The advantages that this method has over the sulphite of potash process are twofold. First the gold and the silver are obtained by a single operation, then the solution of liver of sulphur is avoided, pernicious as well for the sense of smell as for the products kept in the laboratory. Zinc dust allows the operation to be more rapidly performed than with the metal in sheets. On the other hand, the gold and silver obtained, especially when they are in small quantities, are more regularly distributed through the pulverulent matter. It follows that in filtering there is less danger of loss. One condition of success is to use exact quantities, say five times the supposed quantity of the precious metal, then to only use a very weak acid solution, and to carefully distribute the zinc powder in the solution.

To those who might make the objection that the method proposed by Dr. Stiebel offers some danger by the possible presence of arsenic in the zinc powder, which might give rise to arsenical hydrogen, the author advises operating in the open air or in a laboratory having a good draught.—Paris Photographe; Wilson's Mag.

Car Fenders.

A writer in a New York daily, in solving the fender problem, sets forth that the car body should be sufficiently elevated to allow a person lying upon the track to escape contact with it. That as there is usually several feet from forward wheels to front end of car, the driver would have six or seven feet additional space in which to stop the car before the wheels reached the fallen person. He would place a guard close in front of wheels carried very close to track and employ Belgian block or asphalt in order to secure the true, smooth surface necessary to make the low-running fender clear the ground. The writer also says:

"An ideal condition of roadbed, car and safety device would be, first, and principally, a smooth surface road, a car body sufficiently elevated, and a wheel guard attached rigidly to and in front of and entirely around the trucks, reaching within one and a half inches of the ground, allowing that space for the oscillation of the car truck. This means a complete inclosure of the wheel system, and, with a life-saving guard at the forward end of the truck running freely over a uniform roadbed, would positively discount liability of accident."

The Street Railway Review remarks: Certainly a fender that will "fend" is one of the things that is surely coming, where it has not already been introduced, and managers must study the question carefully, as they will soon have to face it, either of their own free will or by ordinance. The elevation of the car body, however, would doubtless be generally considered a great objection, making entry and exit slower and more difficult, while the steps would still hang as low as the generality of car bodies at present.

A Simple Photo-engraving Method.

In the March issue of the Inland Printer Mr. W. H. Hyslop gives the following explicit instructions, by following which he claims that any one familiar with dry plate photography may produce half-tone printing blocks.

Take any of the slower brands of gelatine films—that is, those coated on celluloid—and expose behind a ruled screen in the usual way, giving, of course, a much shorter exposure than given for wet collodion.

Develop the plate with the usual pyro-soda formulæ sent out by the plate makers, and fix in hypo-soda. Wash thoroughly, and while this is proceeding make up a very hot and saturated solution of chrome alum, and have it in a deep tray.

When the washing is completed, plunge the negative into the hot alum solution and keep it there for five or ten minutes, when it will swell where it has not been exposed to the light and remain sunken where it has been exposed.

From this solution the plate is taken and washed; it is then placed in a strong solution of chloride of aluminum for ten minutes, then washed again and dried over the stove.

When dry it is ready for mounting on the block or for electrotyping. If a small edition of prints is required, an electrotype is unnecessary, because the film is already as hard and as difficult to injure as a copper block. It only remains, therefore, in this case to mount the film on a type-high block with celluloid cement, as used for celluloid electrotypes, and it will stand all the impressions desired. Where a large edition is desired the film may be sent to the electrotypers and manipulated in the usual way.

There is no doubt, concludes Mr. Hyslop, but that this is the process of the future, being quicker, simpler, and cheaper than present methods; indeed, it seems impossible that cuts can ever be made at a less price than by this method.

Scientific Safe Making—Manufacture of Burglar Proof Safes.

The latest burglar proof safes and vaults are magnificent specimens of skillful workmanship. Although the doors often weigh tons, they swing as easily on their hinges as a window shutter. After the first great door is thrown back and displays its glittering array of bright locks, its glass-incased clocks and its smooth steel bolts, there is another door almost as strong, with bolts and locks of its own. When this is open, it reveals three other doors. The upper two are of thin steel and have no locks. Only papers and books are to be kept in the little pockets or pigeon holes which they inclose.

Under them and shutting in the cash drawer there is the third door with its own lock and bolts. In this safe the size of the cash repository bears about the same relation to the size of the whole safe as a pumpkin seed does to the pumpkin. And it is not only burglar proof, but fire proof—warranted, in fact, to stand for at least seventy-five hours the greatest amount of heat that any burning building could give it.

The making of a safe of this kind is a complicated and expensive operation, in the opinion of the Chicago Record. All the steel used comes in the form of plates from the works. After having the necessary screw-holes bored in them they are heated to a high temperature and then tempered by suddenly immersing them in water. When they come out they are often a little twisted and warped and have to be rolled cold and sometimes polished clean by a swiftly moving emery wheel. The noise of this operation is ear-splitting and so rasping that a man with ordinary nerves can hardly endure it. When the plate is perfectly level it is transferred to another machine, where it is clamped tight, and an emery wheel shaves off the edges.

The plates are now put together, first one of hard steel, then one of wrought iron or soft steel, and so on until the necessary thickness is obtained. From the iron the safe receives its tenacious qualities—it cannot be cracked or broken as easily as steel—and the steel imparts a hardness that defies the burglar's drill. The screws are also made of combined steel and iron. Each of them is only long enough to reach through two plates, and the screws which join the third, fourth and fifth plates to the first are never directly under any other screws, so that there is no chance for a burglar to bore down through a row of screws. The plates are also drawn very close together, for if any space was left between them, a safeblower might succeed in getting his dynamite into it.

Between the interior and exterior walls of the safe a large amount of hydraulic cement, combined with other ingredients, usually according to a secret receipt, is packed solidly. In case of fire the theory is that the water in the cement—about 43 per cent—will, owing to the heat of the outside covering, become steam, partially, at least, and be driven close to the inner wall. Here it will remain and furnish a blanket impervious to heat. All the bolts are cylindrical and from an inch up to two inches in diameter. Combination locks are now used exclusively. The mechanism of most of them is extremely simple. In one lock there are a number of round brass disks or "tumblers," each pivoted at the center on a small shaft which runs through the safe door and connects with the lock knob. Each tumbler has a slit in it just the size of the steel arm which controls the bolts and reaching nearly back to the center. When all these slits are together and pointing in exactly the same direction, the arm slips into them and the bolts can be thrown. But if the slit in a single one of the tumblers is even a thousandth of an inch out of line, the arm will not slip back. The disks are set a short distance apart, and small screws with big heads are fastened at random over them. As these strike together in turning, the tumblers whirl, and a man might turn the lock knob a thousand years without once getting the slits in all the tumblers together. But the man who knows just how far to turn one way and then how far back again according to the combination numbers has no trouble at all.

The combination and numbers are easily changed by changing the screws in the disk. Many of the best safes and vaults are now being provided with time locks. Two and sometimes three clocks are inclosed in glass cases just inside the safe door. When the door is locked, no one can open it again until the clock hands have traveled the set distance around the dial, and touched a little trigger which releases the bolts. More than one clock is used, so that if one runs down the others will go on and perform their duty. In the big banks the vaults are closed about five o'clock in the evening and set to open a little before nine o'clock in the morning. It is a general impression that an expert burglar can open a combination lock by listening to the clicking sounds, but dealers say it is not possible for any one to do it. If a safe owner forgets his combination, the safe has to be bored into—there is no other way of opening it.

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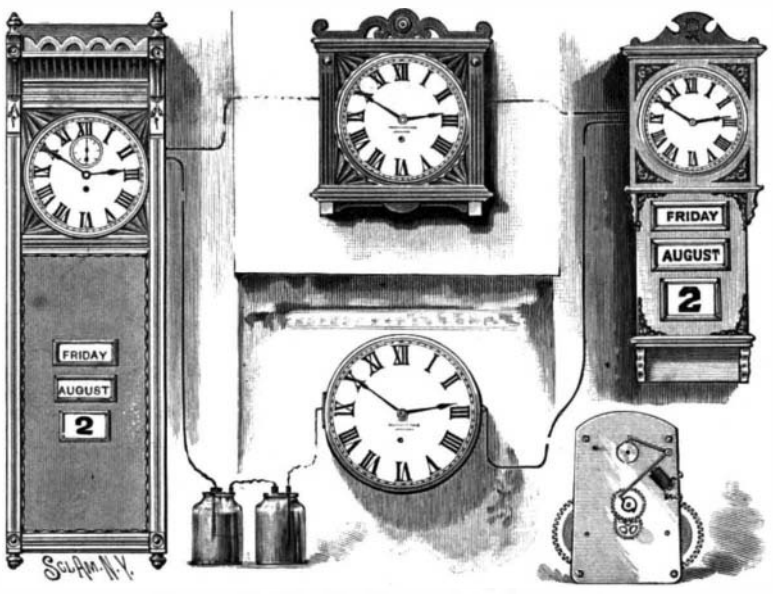
THE PRENTISS ELECTRIC SYNCHRONIZER.

We illustrate herewith a system of regulating and synchronizing timepieces, which has been patented by Mr. Henry S. Prentiss, of The Prentiss Clock Improvement Company, of 49 Dey Street, New York.

A number of clocks are arranged in a single system, with the master clock provided with a circuit closer adapted to close the circuit at a predeter mined period before the hour, and break it at the hour.

In the synchronizer system all the secondary clocks are regulated to run a trifle fast, say from one-tenth to three seconds per hour, and the circuit is closed at the master clock for ten seconds, or other predetermined period before the hour, to vitalize the magnets of the secondary clocks, the latter being held up just before the synchronizing period and then released exactly on the hour, while "slow" clocks are set up sufficiently to make them correspond with the master clock. The small figures show how this is effected by connection with an electro-magnet secured to the frame of the secondary clock and adapted to control a detent lever engaging a toothed disk on the arbor of the scape wheel, the lever being normally held out of engagement with the wheel by a spring. The minute hand of every clock on the line is thus at all times under control. If any of the secondary clocks stop, they can be set without taking special care in setting them to the exact time, since they are regulated to run fast, and therefore will ultimately be brought to correct time. This synchronizer may be applied to any clock. The company also sell the calendar and equalizer described in last week's issue in localities outside of New York City.



THE PRENTISS ELECTRIC SYNCHRONIZER.

THE PROPOSED RAILWAY UP THE JUNGFRAU.

About fifty years ago, says the Graphic, London, when France, England and America were already covered with a network of railways, George Stephenson was invited to go to Switzerland and give the benefit of his experience in the matter of the construction of railways in a country so much cut up by mountains and rivers. Several companies then set about constructing lines of railways in places which lent themselves the more easily to such enterprise, but it was never contemplated then that a day would come when even the most insurmountable obstacles would be conquered, when the highest points would be, as it were, stormed and carried, and the deepest chasms bridged. Since then many climbing railways have been constructed in the mountains of Switzerland—funicular railways and others of that now familiar type which ascend heights by means of cogwheels gripping a center rail, but all uniform in one respect, in that they utilized steam or hydraulic power. The railway up the Righi, with its interlocking wheels, sufficiently demonstrated the superiority of this system, whether regarded from a practical point of view or in the light of such a purely personal point of view as safety, but a disadvantage has always been the smoke and dirt, and the weight of the coal and water which the engines are compelled to carry. But science now makes such rapid strides that it could not in any case have been long before a satisfactory alternative was available, and this is now found in electricity, developed either by steam or hydraulic power, and readily conveyed to any convenient distance. One of the first electrical mountain railways was constructed on Mount Saleve in Geneva. It is this railway which serves as a model for the bold project shown in the engraving.

The concession for constructing a railway of this description, starting from Scheidogg and traversing the interior of the heights of the Eiger, Monch and Jungfrau, at the summit of which it emerges into daylight by means of a lift, was granted by the Swiss government, after long debate, at the end of last year. The railway is more than eight miles long, and rises to a height of 6,890 feet, the gradient varying from 1 to 26 per cent. The lift in the center of the cone of the Jungfrau has to rise 216 feet. With the exception of the station at the point of departure, all the other stations, to the number of six, are bored in the solid rock. The exits communicate with pathways, by means of which travelers alighting can finish the ascent of the peaks on foot. These stations are complete with every luxury possible, containing dining rooms and miniature bed rooms, like cabins on American liners. The lift to the summit of the Jungfrau consists of an enormous tube fitted into the vertical hole sunk in the rock. Within this iron tube the cage ascends and descends, worked by a dynamo, which in turn derives its power from a hydraulic motor utilizing the waters of Lake Luchinen in the Lauterbrunnen. Within the tube is a winding staircase, so that travelers not caring to use the lift may reach the summit of the mountain on foot. The tunnels, galleries, restaurants and lift are all lighted with the electric light, and it is even anticipated that the carriages may be warmed by the same means. It is scarcely necessary to say that the stations are all in communication by telegraph and telephone with the world below. Our illustrations are from drawings by G. Wassermann, engineer, of Bale.

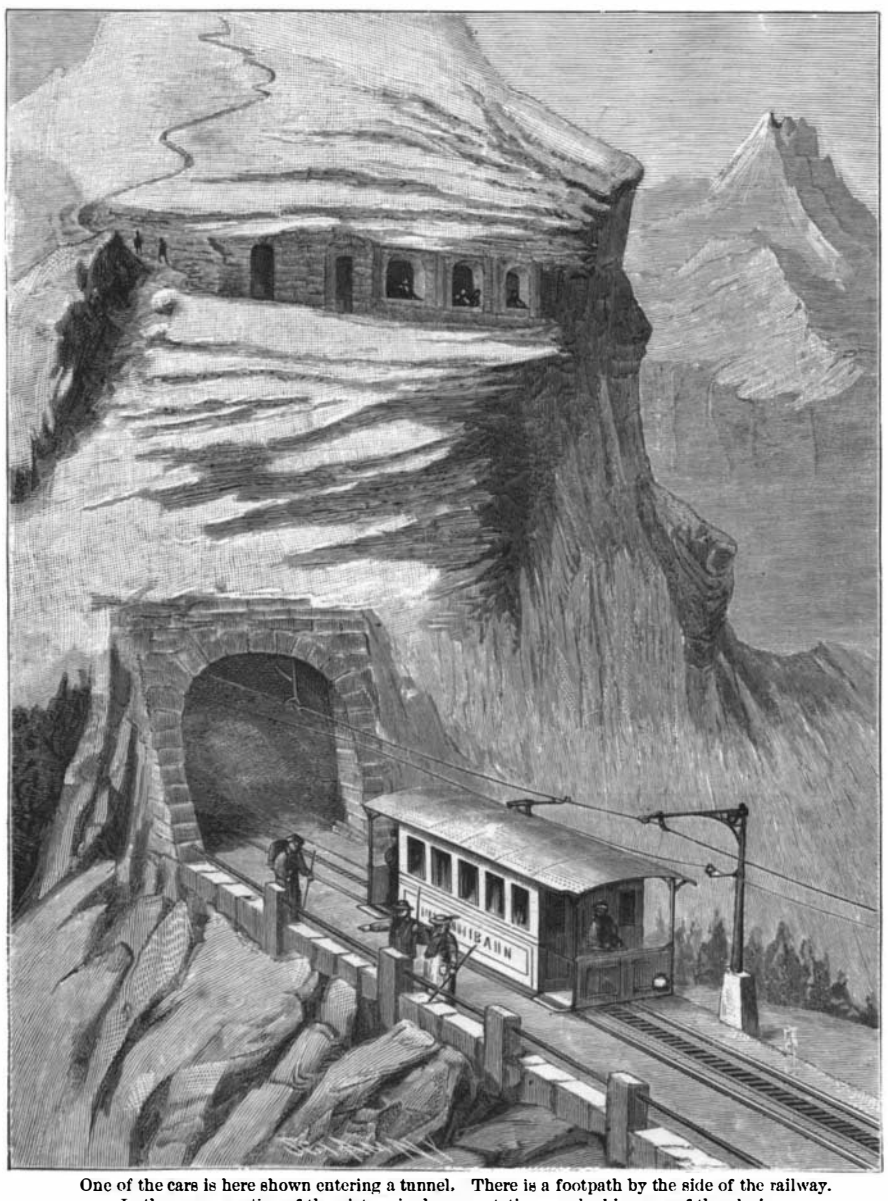
A Novelty in Lantern Entertainments.

A novelty in the way of lantern or stereopticon entertainment has lately been brought out by Mr. Alexander Black, of Brooklyn, who has written and illustrated a picture play called "Miss Jerry."

The story, which is very sprightly and pleasing, is told as the views representing the exact scenes appear on the screen. While the story is being told, the changes in the pictures are so natural that the figures almost appear to move. Among the scenes are many out-door views in New York, many interiors, and real persons; one of the remarkable pictures is an interview of Miss Jerry with Mr. Chauncey Depew. One of the scenes shows Miss Jerry on the Brooklyn Bridge conversing with Superintendent Martin. Another view shows Fifth Avenue by moonlight.

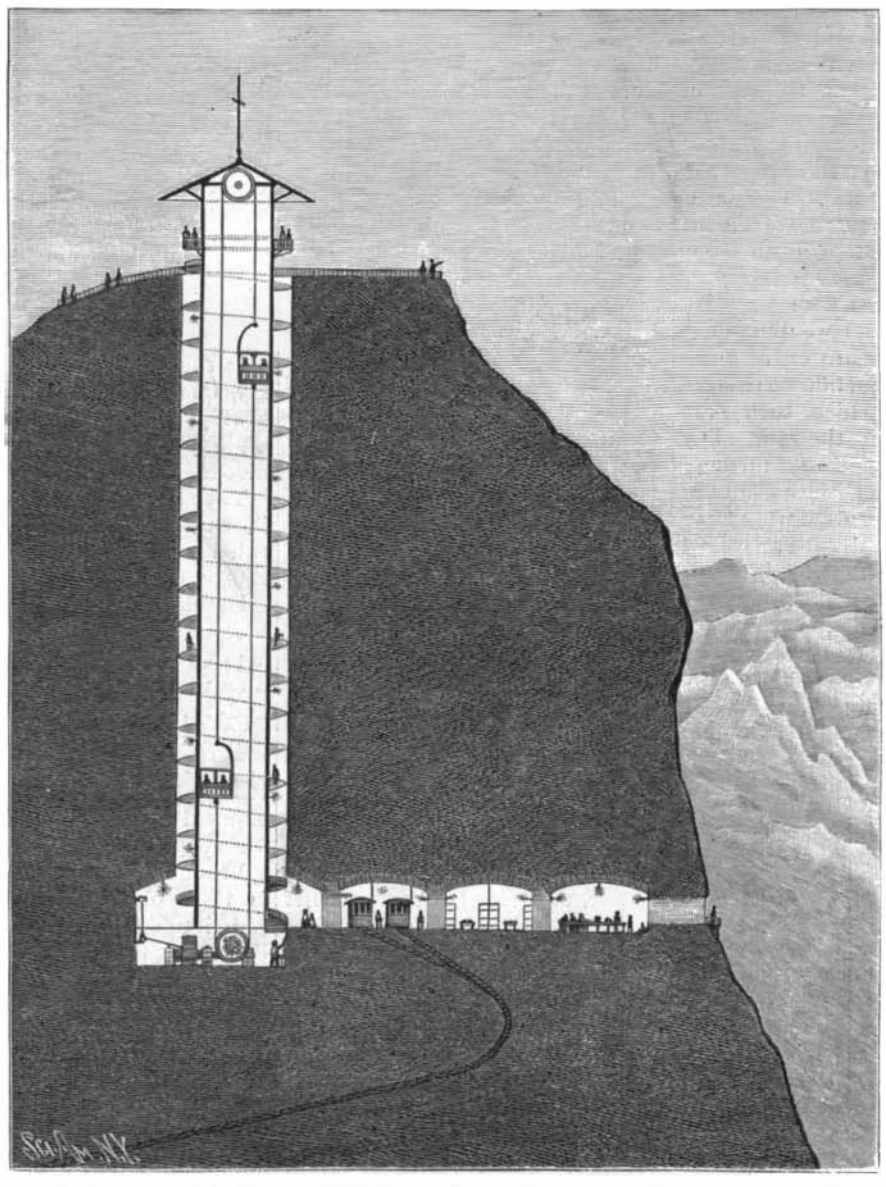
The entire entertainment is of a very pleasing character and reflects great credit on Mr. Black.

IN Australia horses and cattle are now being branded by electricity from storage batteries. The brand is said to be safe and artistic.



One of the cars is here shown entering a tunnel. There is a footpath by the side of the railway. In the upper portion of the picture is shown a station overlooking one of the glaciers.

VIEW OF THE RAILWAY NEAR THE SUMMIT OF THE JUNGFRAU, SHOWING PATH FOR PEDESTRIANS.



The drawing shows the terminus of the railway, with the restaurant attached. Passengers who dislike the lift may walk up the circular footway which winds round the interior of the shaft.

SECTIONAL VIEW OF THE LIFT IN THE INTERIOR OF THE JUNGFRAU CONE.

THE PROPOSED RAILWAY UP THE JUNGFRAU.

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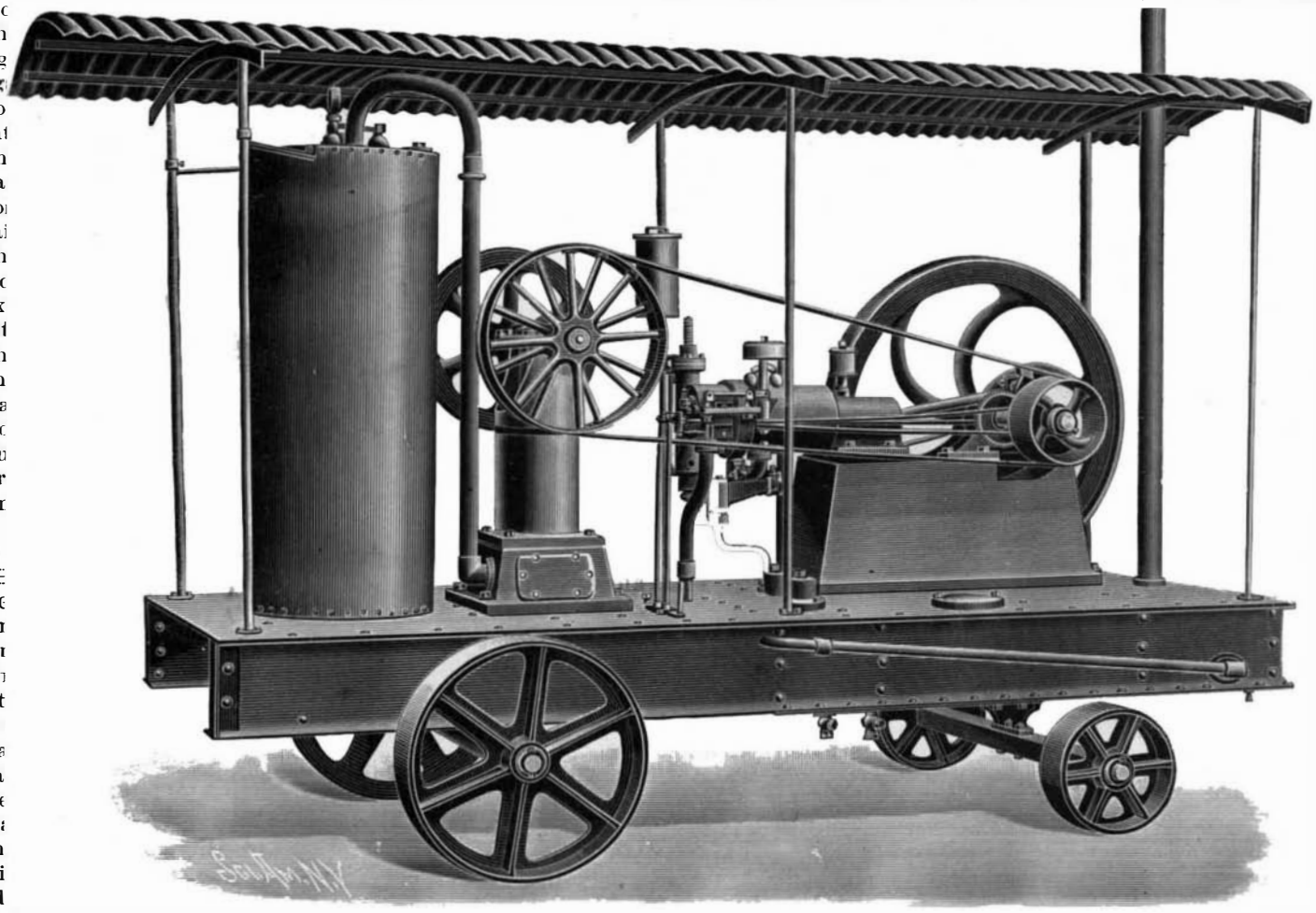
PORTABLE SAND BLAST APPARATUS.

The uses of the sand blast for ornamenting glass, metals, stone, and other materials is well known. A new application of the process for cleaning down the walls of buildings has been introduced in England, which is described in a recent number of Engineering, to which we are indebted for our illustration. It has been used fo cleaning th fronts of larg public building hotels, etc. Upo a truck is mount ed an oil engin which drives a air compresso which fills an ai reservoir to th desired degree c pressure. A flex ble pipe conduct the air to th point desired, an blows the sand a required. Build ing fronts are thu cleaned in a ver expeditious mar ner.



PORTABLE SAND BLAST APPARATUS

PROFESSOR E E. ARMSTRONG in a recent lectur at the Royal In stitution, on "Th Chemical Const tution of th Sugars," said tha Australians ea more sugar pe head of popula tion than an other people i the world Messrs. Cross and Bevan exhibited in the library some specimens of crystallized glycerine. One crystal of glycerine, about 1½ inches long, had a hole bored through it, by means of which it was suspended in some glycerine in a more fluid state than itself contained in a glass bottle.

THE SCOTTE STEAM CARRIAGE.

In the organization of the competition of automobile carriages held last year in Paris, the Petit Journal took the initiative. This journal has for a long time advocated the development of open air exercises. In our SUPPLEMENT, No. 979, we illustrated many of the automobile carriages which took part in the race. The steam carriage of M. Scotte, of Epernay, obtained a prize of 500 francs. In this vehicle, which is adapted for eight persons, the boiler is of the vertical type of the Field system and registered 120 pounds to the square inch. The two cylinder motor makes about 300 to 500 revolutions per minute and develops 5 horse power. The power is transmitted to the (rear) driving wheels through an endless chain and a differential gearing. The carriage is 15 feet in length, 6 in width, and weighs, when empty, 3,700 pounds. With 660 pounds of water, 440 pounds of coal, seven passengers and the engine driver the total weight reaches 5,940 pounds.

The carriage has the form of a brake, provided with a top and with curtains, for which windows may be substituted, thus rendering it a closed omnibus. A rail on the top permits of the carrying of baggage. The consumption of water is from three to four gallons a mile on a level stretch and from sixteen to twenty in mountainous districts. The consumption of coal also varies from six to ten pounds, according to the road and the speed. The carriage did not answer the conditions of the competition, as at Gaillon one of the Field tubes inside the vertical boiler burst and there was an explosion which caused some damage to the vehicle and slightly injured the driver. The judges, nevertheless, decided that the carriage of M. Scotte merited encouragement, so a prize was awarded to it. Without as yet realizing the dream of the tourist or the commercial traveler, the belief is now current in France that the automobile carriage has come to stay. The mechanism is being improved and simplified, and we may soon hope to find them coming into more general use.

THE SCOTTE STEAM OMNIBUS

THE chance of two finger-prints being alike is not 1 in 64,000,000,000.

How to Mount Botanical Specimens.

The secret of obtaining fine specimens lies in drying them before decomposition has had time to take place, and applying as much weight as possible without injuring the more delicate portions of the plant. The specimens should remain in the press till all moisture is absorbed, which is, in most instances, about a week. In herbaceous specimens the entire plant is easily preserved. Bulbous roots may be managed with very little trouble by sectioning the root when too bulky. Succulent plants should be immersed in boiling water before being placed in the press. Each sheet should show specimens of both flower and fruit if possible. In the case of herbs, this can usually be done with one and the same specimen. When the seasons of flowering and fruiting are separated by some weeks, leaves should be preserved with each specimen, as the foliage often changes materially in appearance during that time. Where it is impossible to show the entire plant on a single sheet, the root and leaves should be shown in connection with the branches. In drying, it is well to turn part of the leaves wrong side up, thus showing the appearance of both sides of the leaf; this is especially desirable in the fern family, if only one frond is shown. It is better to mount two or more leaves, and in that way give the different views. Never mount more than one species on a sheet; variations of the same species may be placed together, as the violet self-heal (Prunella vulgaris) with its freaks of blush and white. For mounting, Linnæus used sheets of foolscap, but that size is now universally conceded to be too small for practical purposes. Most botanists prefer sheets 12 × 17 inches, and some use a double sheet. While this method protects the plant more, it adds to the bulk of the herbarium and to its cost, and on the whole it is questionable whether the advantage gained by the use of the double sheet balances that lost.—American Gardening.

Saturn's Rings.

Prof. James E. Keeler has made the interesting discovery that the ring of Saturn is made up of many small bodies, and that the satellites of the inner edge of the ring move more rapidly than those of the outer edge. The motion of the different parts of the ring, in miles per second, can only be given after the photographs have been accurately measured under a microscope. In a few days Prof. Keeler will give accurately the rate of speed at which the different parts of the ring revolve.

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The Cost of Power at Niagara.

The company which has undertaken to develop electricity, at Niagara, on a large scale, for manufacturing and other purposes, has acquired more real estate there than it needs for its own use, in order to furnish sites to such of its customers as wish to establish their business close to the source of their mechanical power supply. But the public has been led to expect that, in addition to serving local interests, the company would also furnish electricity to places scores, if not hundreds, of miles away, and there has been much speculation as to the feasibility of carrying such plans into effect. Owing to her proximity to the Falls and her great size and industrial activity, Buffalo has been regarded as the first center of population, removed from Niagara, to be provided for. It is not yet quite clear whether that city feels that it is enjoying a privilege or conferring a favor in letting the Power Company invade its precincts. Perhaps she has not determined that point herself. The matter is evidently still under consideration. In reply to some inquiries from representative Buffalonians, the Power Company recently offered the following terms: It would let the municipality or a private corporation come to Niagara, take water from the Power Company's canals at the rate of $10 a horse power and manufacture its own electricity; or it would furnish power off the turbine shafts at $13, or electricity at the power house at $18. But if the Power Company undertook to do anything of this sort, it would not contract to deliver less than 10,000 horse power; hence, Buffalo must agree to take, at least, that much or none at all. The Niagara people would not accept a franchise to operate a line to and in Buffalo for a shorter time than that for which its own bonds have been issued. No price is given for electricity delivered at a central station in the suburbs of that city, fifteen miles from the Falls, so that the company's own estimate of the probable waste and cost of transmission is still withheld. There would be four kinds of losses: (1) In transforming at the power house up to a high voltage, (2) on the line, (3) in transforming down at Buffalo, and (4) in distribution over street lines to consumers. These could not well amount to less than twenty or thirty per cent altogether, and they might, perhaps, reach fifty or sixty per cent. But if, for example, they amounted to just one-half, the $18 rate at the generator shaft would mean $36 to the consumer, without adding anything either for interest on the cost of the transmission plant or for operating expenses. This, however, is probably an extravagant estimate. The prices actually given, by the way, are for a twenty-four hour daily supply. Some establishments require power, however, for only ten or eleven hours. Whether it would pay to put in storage batteries to utilize the surplus is a question which their managers must naturally consider. Richard Hammond writes to the Buffalo Courier to say that steam power, on a scale of 1,000 horse power, for ten hours daily, can be generated in Buffalo, where coal is very cheap, for $21 per horse power. The Power Company, however, denies this, and estimates the cost at $32, besides quoting various experts as estimating the cost on a twenty-four hour basis at between $45 and $60. In some other cities, where coal is more expensive, it is said to be from $60 to $75. If, after this discussion, Buffalo decided neither to buy on the terms offered nor to let the Power Company bring in its own lines and supply the market, more distant cities may possibly be deterred by her example from patronizing the Niagara concern; but as the latter supplies its local customers with electricity at $20 per horse power, in large quantities, there may be a greater industrial development at the Falls than would otherwise result. --N. Y. Tribune.

The Lighting of the Brooklyn Bridge Cars.

The lighting of the cars of a cable road by electricity is a novelty and requires the use of some special apparatus. In the main, the plan adopted on the Brooklyn Bridge resembles the now familiar trolley system. A bare copper wire is suspended from poles and from the framework of the bridge. This wire is carefully insulated, the return is made through the rails in the usual way. The current is supplied from the power house in Brooklyn. It is led to the center of the bridge through a feeding cable, which there divides into two branches, one leading to each of the towers and there connecting with the overhead wire. The overhead wires are in turn connected together at intervals of 500 feet. The height of the wire above the car was regulated by the framework which extends over the three suspension spans. The distance that this framework clears the car only allowed the wire to be suspended nine inches above the roof of the car. At first it was thought that a regular trolley with a short pole could be used, but the rocking and swaying of the cars was so great in proportion to the distance of the car from the wire that it had to be abandoned. Springs were used to allow the trolley a certain amount of play, but this was not enough to keep the wheel on the wire. A roller was then substituted for the wheel. This roller is made eighteen inches long and is mounted in two arms, with which the roller forms a triangle, the apex being attached to the hinge and spring. The length of the roller is really greater than is necessary, but it allows a safe margin and there is very little chance of it ever jumping the wire. In the day time the roller is lowered to avoid unnecessary friction. When the lamps are to be lighted the trainman of each car pulls a lever at one end of the car which operates bell cranks and a connecting rod, which raises the roller into contact with the wire.

It has been found advantageous to have the roller trail, no matter in which direction the car may be going. On the Brooklyn Bridge the lighting trolley or roller is tripped and reversed automatically in the stations while the cars are being switched, by means of a rigid frame. The cars are all connected by wires, so that if the trolleys on all the cars but one should get out of order, that one would be sufficient to light the train. When the cars are being switched this system prevents the flickering of the lights. As in the bridge itself, there is a slip or expansion joint in three places to allow for the expansion and contraction caused by changes of temperature. Great care is taken to maintain an even tension on the line.

The former plan of lighting the cars was the kerosene lamp system, and the poorness of the illumination was the subject of considerable comment. The residents of New York and Brooklyn are pleased with the fine light given by the twelve incandescent lights with which each car is equipped, and are now asking why the same system cannot be applied to the extensive elevated railroad systems of both cities. The subject of lighting cars in cities is now receiving great attention, and the results obtained on the Brooklyn Bridge and on the Broadway and Third Avenue cable roads, which are lighted with gas, show that both gas and electricity are admirably adapted to city car lighting, without reference to the motive power employed.

Another Fire in the Patent Office.

The United States Patent Office was for the third time visited by fire at about 1:15 P. M., April 22. The scene of the blaze was in the southwest corner of the basement, in the photographic blue print room, close to a crowded public thoroughfare. Mr. Flint, chief of this room, was pouring ether into five gallon jugs, when some was spilled, and, running down the floor, came in contact with the stove and ignited. Mr. Flint was caught in the flames and severely burned about the face, arms, and shoulders. He was removed to a drug store across the street, where his wounds were dressed, and he was then taken to the Emergency Hospital.

Watchman Parkins, who ran into the room to see what the trouble was, was also caught in the flames, and received painful burns. Miss Nevius, in charge of the telephone lines in the building, whose office is in the adjoining room, was overcome by smoke and fainted, but was carried out uninjured by one of the employes. The room was filled with chemicals and explosives, which burned fiercely and emitted vast volumes of smoke, which caused a hasty stampede of the clerks employed in other portions of the building.

The photographers and assistants had many narrow escapes for their lives, and nearly all were on fire, as the explosives flew all about the room. Besides Mr. Flint, the chief, there were present at the time of the explosion, Assistant Photographer Theilkill, J. B. Wheat, Jr., J. E. Latimer, and Mr. Blackage, assistants. Mr. Theilkill's story of the occurrence was that while Mr. Flint was pouring about five gallons of ether into a bottle the bottle fell to the slate floor and broke, the contents running along the place. He began sweeping it toward the door, remarking to those about to be careful with the lamps, etc. Some of the fluid reached the stove and there was an explosion, which was quickly followed by a second with considerable force, blowing up about seventy-five bottles. Mr. Flint was blown through the door, his head striking a mass of papers piled in the hallway. He arose, his clothing in a blaze, and rushed for the area, calling for help.

J. B. Wheat, Jr., was standing near Mr. Flint, and was also blown through the door, his hair ablaze and clothing torn. He received no permanent injuries and attended to Mr. Flint. J. E. Latimer was blown through the open window onto the lawn, and was followed through the adjoining window by Mr. Blackage, who was in the dark room at the time.

Mr. Theilkill was blown across the room by the first explosion. He was blown through the window by the second. His escape from injuries was a miracle. His apron was on fire, his head singed, his hat blown into fragments, and his coat torn in many places.

Stored in the room were 18 gallons of collodion, 200 gallons of ether, and 100 pounds of gun cotton Of course these and everything else in the room were totally destroyed.

After half an hour's hard work the firemen extinguished the flames before they could spread to the adjoining offices. The loss was about $1,500, principally in photographic apparatus. Most of the original drawings were saved, and of those destroyed a good many can be replaced. Along the halls in the vicinity were stored a number of files which contained records of the office and other papers, and a great number of these were damaged by water.

The Patent Office has twice previously been on fire. In 1877 a fire occurred there which burned for twenty hours and totally destroyed the museum, necessitating the entire reconstruction of that portion of the Interior Department building.

Artificial Silk.

Patents for the production of artificial silk have been granted to Chardonnet, De Vivier, and Lehner. The only process now worked on the commercial scale is that of Chardonnet, whose first patent was taken out in 1885, although the method was not generally known until the Paris Exhibition of 1889. According to this first patent, cotton is treated with nitric and sulphuric acids, and the nitrocellulose obtained is dissolved in a mixture of ether and alcohol, with the addition of a small amount (0·2 per cent) of some metallic salt to lessen the danger of explosion. The solution is pressed through a system of fine capillary tubes, whose openings have the diameter of a natural silk fiber, into hot water, in which the ether and alcohol evaporate, leaving a fine thread capable of being spun. It possesses, however, great inflammability.

A company with a capital of 6,000,000 francs was formed at Besancon to work Chardonnet's process, in which several improvements were made. For cotton is substituted the cheaper wood cellulose. The nitrocellulose, after its solution in ether and alcohol, is denitrated with acetic and sulphuric acids, and its explosiveness thus removed.

The processes of De Vivier and of Lehner very closely resemble that of Chardonnet. De Vivier dissolves nitrocellulose in glacial acetic acid, with the addition of solutions of fish glue in glacial acetic acid, and guttapercha in CS_2. Lehner dissolves a mixture of silk waste and nitrocellulose in ether and alcohol.

Chardonnet's artificial silk appears in commerce as a grayish-white, lustrous fiber, similar in appearance to boiled-off natural silk. It lacks the softness and the peculiar crackling feel of "boiled-off" silk. In tenacity and elasticity it compares unfavorably with the natural product. Experiments with fibers of similar thickness gave the following results:

	Strength (Tenacity).	Elasticity (Amount of stretch).
	Grms.	Mm. Meter.
Natural silk	214	189 in 1
Artificial silk	69	155 in 1

In a room of average dryness, dry artificial silk absorbed in two hours 16 per cent of moisture; the legal amount for natural silk is 11 per cent. The specific gravity of artificial is about 13 per cent higher than that of natural silk.

In dyeing properties the difference is very marked. On soaking with water the artificial silk fiber becomes very weak and must be handled with the greatest care. Soap solutions do not greatly injure the fiber, but free alakalies bring about an alteration which in concentrated alkaline liquids extends to complete solution of the fiber. Dilute acids are without injurious effect.

Dyeing is accomplished without addition of soap or acid to the bath, so that the number of dyestuffs applicable is somewhat limited; the most suitable are the basic dyes, with a few "direct cotton" coloring matters. Various shades may be obtained.

There is no doubt that artificial silk can be produced more cheaply than natural silk, and can replace it in many branches of the silk industry.

What Immigration Costs.

There is one aspect of the immigration question that appeals purely to business men. The social and moral influences on the American people of the unrestrained horde of Europeans pouring upon our shores are, of course, the most important, but the heavy tax in money thus levied upon the American people is not to be disregarded.

According to the last census, in addition to those of foreign parentage, the persons of foreign birth supported at the public charge of the people of the United States were divided as follows:

Insane	35,300
Criminal	15,932
Pauper	27,648
Total	78,880

The average annual cost of a pauper, a lunatic or a prisoner in the conservative and economically managed public institutions of Massachusetts is one hundred and fifty dollars.

The annual cost, then, of maintaining this standing army of foreign born vagabonds is not less than $11,832,000.

If to this could be added the expense of maintaining the American born children of foreign paupers, vagabonds, and criminals, the figures would be even more startling, but unfortunately the figures on parentage are defective.—Commercial Bulletin.

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Correspondence.

Frozen Soap Bubbles.

To the Editor of the SCIENTIFIC AMERICAN:

Having noticed your item about soap bubbles in your last issue, I will cite a curious thing that happened here last winter when the thermometer stood about 14 degrees below zero Fah. One of my children, a little boy, was "blowing soap bubbles," and suggested that he try what the cold weather would do to them. I consented, and, after blowing one, sent it adrift in the usual way, when it froze instantly and fell on to the snow a frozen hollow sphere of ice. It was tried several times with the same result. A curious fact, also, was brought out, that when the thermometer rose to 0°, no frozen spheres could be made, whether from change of temperature or change of air I could not ascertain. I would like to know if this can be accomplished at a lower altitude, where the air is not so dry as it is here. WILLIAM PIM.

Denver, Col.

Curious Electric Discharge.

To the Editor of the SCIENTIFIC AMERICAN:

I am making asphalt pipe. The process is as follows: Crude asphaltum and gravel, equal parts by measure, are each heated in separate kettles to 400° F., then both are mixed together and filled into sheet iron moulds. The space between the moulds is maintained by a cast iron ring on the bottom and the moulds are held to that ring by inside and outside wrought iron rings. After the moulds are cooled off, which takes time according to the size of the pipe, from two to eight hours, they spring off from the pipe after the wrought iron rings have been removed and the moulds tapped with a hammer. Just at the moment the moulds spring off there can at times be seen large sparks between the sheet iron and the pipe. By having my hands on the pipe and the moulds I received sometimes such heavy shocks as to draw my arms together. Men working for me have experienced the same.

The object of this letter is to find out if you or any of your readers can explain how this electricity, for such is what I judge it to be, accumulated there, and why it discharges just at the moment the moulds are taken off. GUS. SCHADE.

Anaheim, Cal.

[The description suggests that a condenser is formed by the combination, which is discharged on opening the mould. Whence the charge is derived is not clear.—ED.]

The Timber Boom.

Both in a saving of time and timber, the "boom" is a vast improvement over the raft. In the first place, there is no boring of logs and afterward fastening them together, as in the rafting method, and thousands of feet of fine timber are thus saved. Then the reduction in expense in caring for the logs is considerable. A lumberman's description of a boom is as follows:

"In simple language, a boom is nothing more than a floating pen, in which the logs are corraled as they drift down stream. It may extend along the banks of the creek or river for one, two, three or even five miles, and is divided into pockets or sections of whatever length may suit the conditions under which the boom is constructed. At the head of each pocket there is an opening, and extending obliquely across the river, from the head of each pocket to the opposite shore, is what is known as the 'sheer,' a floating line of logs chained together, that serves to swerve the saw log from its course in midstream at such an angle that it will go directly toward the opening in the pocket of the boom on the other side of the river. These sheers extend from every opening in the boom. It will be seen, then, that the boom, when rigged out for business, becomes a series of funnels and pens with which to catch and hold the logs, but it requires a good deal of expert manipulation to 'save the crop' when the tide is running high and flowing fast."

Cheaper as the boom system is than the rafting, the cost seems a big item when put into figures. The construction of pockets, etc., for a two and one-half mile boom, in Breathitt County, for instance, came to eight thousand dollars recently. Near the pocket ends of the shears and at the openings in the booms, platforms are built on which the "sorters" are stationed, men who, with pike poles, pull in the logs as they float by. The work is sometimes fast and furious, as when logs are going by at the rate of from fifty to ninety a minute. Sometimes the men are obliged to work for two or three days and nights at a time, only the excitement of the work sustaining them. Their food during such an ordeal is taken by "jerks and snatches," and lucky is the "sorter" who is excused for a cat nap. At night the river is lighted by basket torches, and for warmth fires are lighted on beds of sand which have been laid on the platforms. During a recent big run at Beattyville, on the Kentucky River, one firm alone caught eighty thousand logs.—New York Evening Post.

British Copyright Decisions.

The arguments in a suit that has been before the Law Courts, and has attracted a good deal of attention, for the last year and more, after occupying the court for several days, were concluded recently. The suit has become known as the "Living Pictures" case. The case, taken by itself, is of little immediate interest to photographers, but there are other cases in connection with it that are of importance to all holders of copyright.

It will be remembered that somewhere about this time last year the Empire Theater of Varieties produced a series of tableaux, "Pictures of Living Masters Realized," and among the number were several popular ones, in which Herr Franz Hanfstaengl, the well-known publisher of Munich, London, and New York, holds the copyright. Soon after their exhibition, that gentleman, the plaintiff in the several actions, instituted an action for an injunction to restrain the exhibition of his works in that way, and claimed penalties and damages for the infringement of his copyright. During the arguments, at that time, the case of Turner v. Robinson was freely quoted, and it has considerable interest in connection with the two other suits to be referred to presently. That case was this. The plaintiff, Turner, was the holder of a copyright of a painting, the Death of Chatterton. The defendant, a photographer, after seeing the picture, arranged in his studio a garret scene like that depicted in the painting, and introduced a living model in the same pose as the Chatterton in the picture. He then took photographs of it, which he afterward published. Proceedings were taken for an infringement of copyright, and it was decided that the photographs, though taken from solid accessories and a living model, were an infringement of the copyright in the original picture, and that judgment was upheld on appeal to a higher court.

In the Empire case, now to be referred to, it was decided by Mr. Justice Stirling that the tableaux were not an infringement of the plaintiff's copyright, in so far as the models were concerned, inasmuch as the Copyright Act of 1864 enacts that the pirated works should be forfeited to the owner of the copyright, and, of course, this could not be done with the living models, though, in the case of the backgrounds, it might be different, as the act distinctly mentions piracy of the picture, or "any part thereof." He refused the injunction applied for, on the defendant's giving an undertaking to keep an account of the number of times the backgrounds were used and the amount of money received at the doors of the theater where they were until the trial of the action. The backgrounds, it may be mentioned, were soon substituted by others. Against the judgment of Mr. Justice Stirling the plaintiff appealed, but the Court of Appeal upheld the judgment of the court below. The arguments in the trial of action were concluded recently and among the witnesses called were some Royal Academicians, who testified that the backgrounds were a very important part of the pictures. The artist who painted the Empire backgrounds was also called, who stated that he was supplied with the plaintiff's photographs to work from, and he copied them as near as he could. In the end, Mr. Justice Stirling reserved judgment in the suit.

Arising out of this case were two others that are of greater direct interest to photographers, particularly now that they are beginning to stand up for their rights against the illustrated press, and indeed to the holders of copyright generally. When the Empire first produced the "living pictures," the Daily Graphic and the Westminster Budget reproduced some of the tableaux, whereupon Herr Hanfstaengl proceeded against both papers for infringement of copyright—seeking an injunction. The case against the Daily Graphic was dealt with some time ago, when Mr. Justice Stirling decided in favor of the plaintiff, as might have been surmised from the ruling in the Chatterton case just referred to. Against this judgment the defendants took the case to the Court of Appeal, and that court reversed the judgment of the court below. Then the plaintiff appealed to the House of Lords, and here the ruling of the Court of Appeal was affirmed. Their lordships said that, looking at the variations between the originals and the rough sketches, the latter were not, in fact, copies, reproductions, or colorable imitations of the original pictures or the design thereof, and did not constitute an infringement within the Copyright Act.

The suit against the Westminster Budget was very similar to that of the Daily Graphic, except that the sketches were more complete and elaborate in the details, and was, for convenience, proceeded with simultaneously with that of the Empire. Two R. A.'s, Mr. Alma Tadema and Mr. Marcus Stone, who were also witnesses in the Empire suit, testified that the cuts were decidedly copies of the plaintiff's pictures and the design thereof. One of the witnesses, after he had been shown one of the cuts in the Daily Graphic and expressed his opinion upon it, was asked by the counsel for the defense if he would be surprised to learn that the House of Lords had decided that these crude cuts were not infringements, created some amusement by replying to the effect that he should not be at all surprised at any decision of the House of Lords on questions of art. It was contended that the pictures in the Westminster Budget were better than those in the Daily Graphic, and that they came within the Copyright Act.

In delivering judgment, Mr. Justice Stirling said that, in the case of the Daily Graphic, he had thought that the sketches were copies or colorable imitations of the pictures of the plaintiff. They might be bad copies, or imitations, if you please, still he thought they were copies; but the Court of Appeal and the House of Lords thought otherwise. After reading from the judgments delivered by Lord Lindley and the lord chancellor respectively, the learned judge said it became his duty to apply in his court the principles that were applied in the Court of Appeal and in the House of Lords in the case before him, and, in the result, he gave a verdict for the defendants, with costs. He, however, stayed execution pending a question of appeal, and so the matter rests.

From the above judgments it would appear that if, as in the case of the two journals proceeded against, the cuts are crude or badly done, there is no infringement of copyright. Indeed, on the judge remarking that the faces were entirely different in the two pictures, and that it was for that reason, among others, that the lord chancellor had pronounced the Daily Graphic reproductions to be no infringement, Mr. Moulton, Q.C., for the plaintiff, then asked if it was contended that you cannot infringe copyright unless you are a good artist? His lordship replied that he had no occasion to lay down any proposition of that sort. He was content to take his stand with the words of the highest authority which was provided for his guidance. The decisions in the two cases referred to clearly tend to render the present Copyright Act still more unsatisfactory than it was before to the owners of copyright, whether photographic or otherwise.—British Journal.

A New Cunard Cattle Steamer.

The trial trip of the latest addition to the Cunard fleet, the twin-screw steamer Sylvania, recently took place in the Firth of Clyde. Built by the London and Glasgow Engineering and Iron Shipbuilding Company, Limited, Govan, the Sylvania is to be engaged in the cattle and cargo trade between Liverpool, New York, and Boston. Although a cargo steamer, the vessel has rather a fine appearance. The Sylvania is 460 ft. long over all, 49 ft. beam, 42 ft. 6 in. deep from shelter deck, and carries 6,500 tons dead weight. The vessel being twin screw, the framing of the after end is carried out to meet the stern tubes, and ends in a massive steel casting on each side built into the hull. There are nine watertight bulkheads extending to the upper deck, and these are fitted with watertight doors on each side in the 'tween decks for the handy working of cattle or cargo. In all there are 24 compartments for water ballast, and part of the double bottom under engines may be utilized for carrying reserve fresh water for cattle or boiler use. The bulkheads are so arranged that any two compartments, and in some cases more, may be bilged and the vessel still keep afloat. The entire vessel, including all the holds, 'tween decks, engine and boiler spaces, and cabins, is lighted by electricity on the double-wire system, generated by two compound-wound self regulating dynamos situated in the engine room. At each of the seven hatches there is a cluster of 16 lamps of 16 candle power. The two sets of triple expansion engines have cylinders 22½ in., 36½ in., and 60 in. in diameter by 48 in. stroke, and two large double-ended boilers fitted with Howden's forced draught. There is a large auxiliary boiler for winches, electric lights, etc. The propellers have bronze blades, and the shafting is of Vicker's steel. The vessel was tried both on the measured mile and between the lights, and proved in every way satisfactory—a speed of 15¾ knots being obtained between the lights.

The New Mail Bicycle.

The New Mail bicycle is an honored name. It extends back to the days of the "good old ordinary," as the high wheel of early days came to be affectionately termed by its old-time devotees. Now that the high wheel is extinct, the name continues and is applied to a representative high grade safety of the most advanced lines of construction. It is a twenty-three pound wheel, with high frame and large tubing, thus embodying the two leading points of 1895 construction. It is constructed by William Read & Sons, 107 Washington Street, Boston, Mass. The adjustable handle bars and detachable sprocket of original design are other characteristic features. The seat rod is also new in plan and is found to be an acceptable improvement. The wheels have wooden rims, and for tire on the regular mounts an endless inner tube tire has been chosen, one which gave great satisfaction in 1894, and which, as improved for the present year, should give still greater. The lady's wheel, with loop frame, is made of identical standard with the man's wheel.

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THE NEW YORK HERALD ESTABLISHMENT.

The most beautiful printing establishment in the world, architecturally considered, and the most perfect in its equipments, regarded from the mechanical standpoint, is that of the New York Herald, which occupies the costly square formed by the junctions of Broadway, Sixth Avenue, Thirty-fifth and Thirty-sixth Streets, one of the great foci of business and population in this proud city.

In the dimensions of the Herald building there is nothing overpowering to the senses, nothing gigantic to strain the eye in reaching for high sky lines, nothing to weary the mind with enumeration of vertically piled stones and window sills. From a distance one only sees a quiet two-storied, tile-roofed building. But as one draws nearer, the structure changes into an object of varied and surpassing beauty. Sculptured columns and graceful arches occupy the four fronts of the edifice, giving support to walls and cornices that are models of harmonious proportions, elegance, richness, and perfection of decoration. The exterior of the Herald building is a gem of beauty, a crystallized dream of art. The edifice is a copy, or rather a happy adaptation by architects McKim, Mead & White, of the celebrated ornate structure known as the Palazzo del Consiglio, which still stands in Verona, Italy, and which was built toward the close of the fifteenth century by Fra Giocondo.

THE NEW YORK HERALD BUILDING—GENERAL VIEW

Our first page plate is a photographic representation of the beautiful group of statuary which adorns the

THE NEW YORK HERALD ESTABLISHMENT—BUSINESS OFFICES AND GRAND STAIRWAY.

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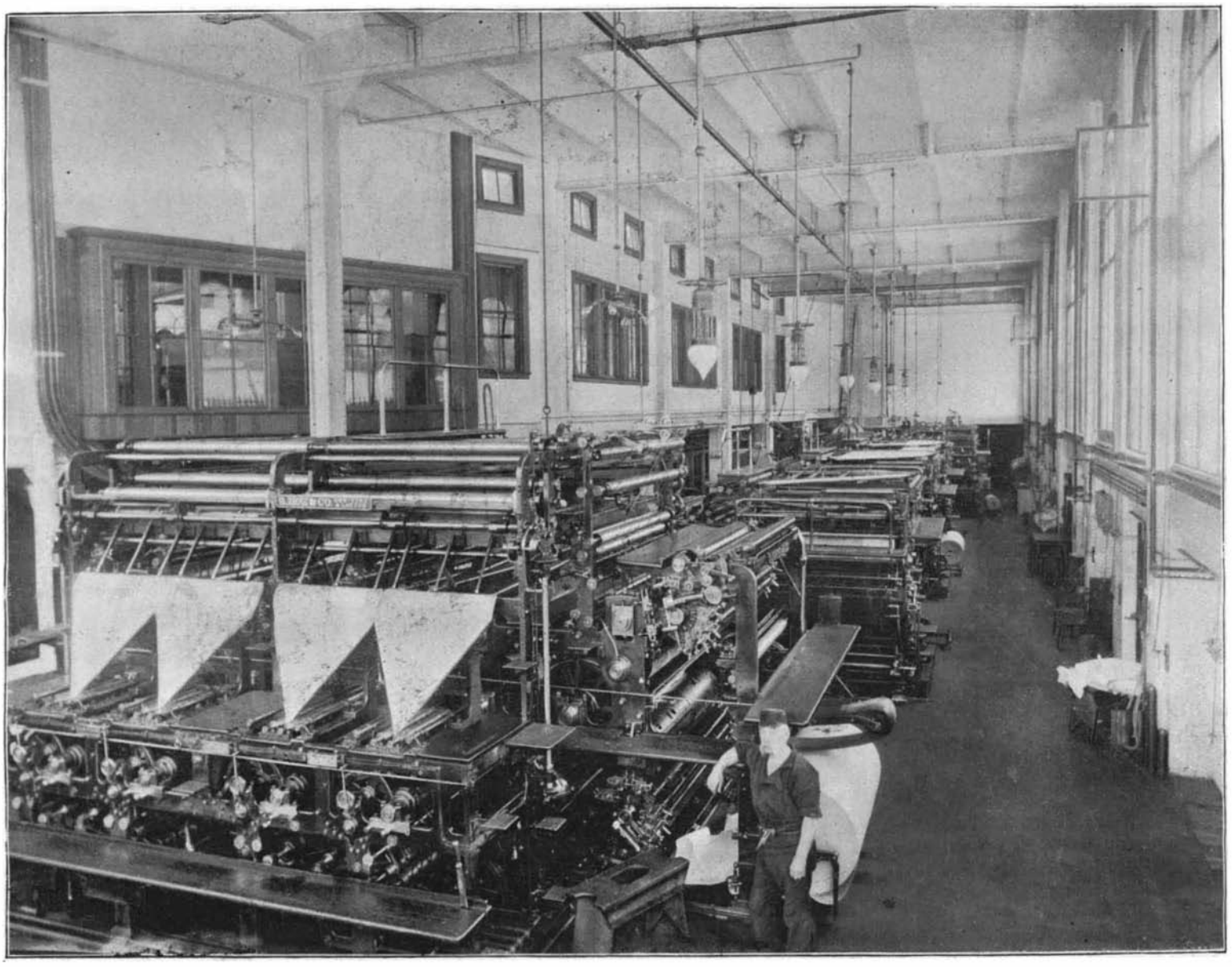
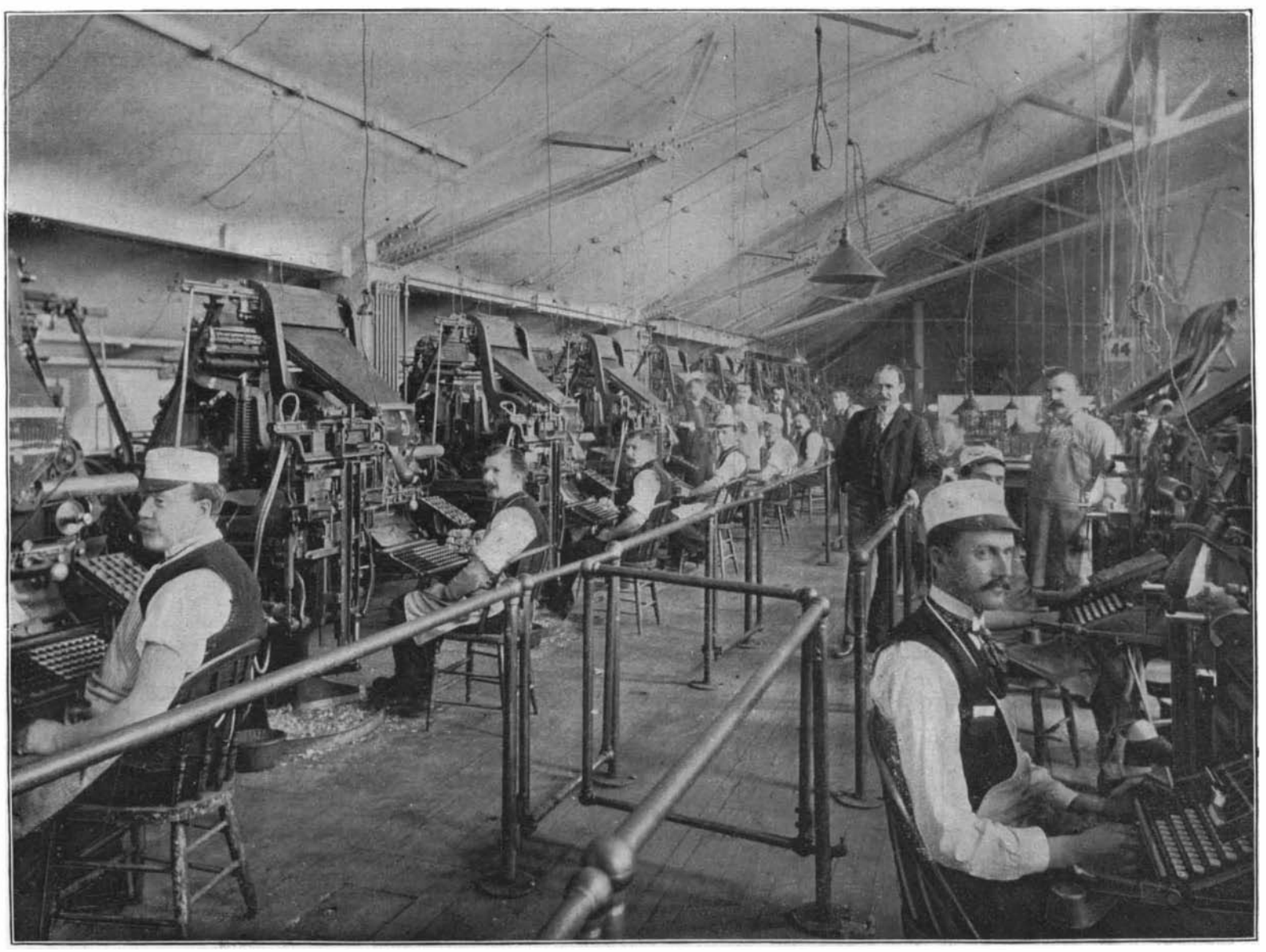
entrance front of the Herald building on 35th Street. The statue of Minerva here appears in the attitude of directing the artisans at her feet to sound the great bell and proclaim the onward march of time. This group of statuary is from the chisel of Antonin Jean Carles, the distinguished French sculptor, whose many admirable works are well known, and some of them were exhibited at Chicago. The bronze workmen shown in our group are movable figures, operated by machinery, and as the time comes around their bodies sway, the hammers move, and the bell sounds the hour. The bell, however, is not actually struck by these moving figures, but by a special hammer located at the back of the bell.

The machinery by which the bell is sounded and the clock mechanism driven is shown in our plate, just above the clock face. One of the machines operates the clock, the other works the figures. The connecting



THE NEW YORK HERALD ESTABLISHMENT—A VIEW IN THE PRESS ROOM.



THE NEW YORK HERALD ESTABLISHMENT—A VIEW IN THE COMPOSING ROOM.

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rods can be traced by an examination of the plate. This mechanism is by the Howard Clock Company, of Boston, Mass., and its accurate working gives much satisfaction.

Our next illustration shows a general exterior view of the Herald building as it appears from Herald Square, looking north. The long colonnade fronts on Broadway; the main entrance to the building is on Thirty-fifth Street. The next engraving is an interior view, showing the publication office of the establishment and the grand stairway leading up to the various editorial offices, news offices, reporters' rooms, telegraph and telephone offices, etc.

The decorations of the publication office make it a most attractive apartment. The rim of the counter surrounding the circular edge of the room is surmounted by a brass rail with plate glass set in spacious framework of brass. Rising from the floor at the edge of the counter to the ceiling are handsome marble columns with Corinthian caps and richly ornamented decorations. The ceiling is treated after the style of the Renaissance, and in the most elaborate and finished manner. The floor of this room is set in mosaics of rich pattern, and both at the entrance and at the sides the walls are of marble.

The press room is situated on the Broadway side of the building, occupying about one-half the plot, from a point 66 feet back from the corner of Thirty-fifth Street and reaching to Thirty-sixth Street. It is 149 feet long and 38 feet wide and from floor to ceiling about 30 feet. There is nothing in the building lower than the floor of the press room, which rests at the bottom of the basement. It is also the highest room in the building, filling up the space of two floors, and it thus enables spectators standing on the level of the arcade to see the results of the work done by the presses. The latter are set upon strong, solid foundations and their tops reach about to the level of the street. Those who look on through the windows from the arcade see the white rolls of paper as it enters the press and as it comes out printed, filled with news and folded.

One of our engravings shows the crowds of spectators who at all times fill the press room arcade or corridor when the presses are in operation.

Another plate is a perspective view within the press room corridor, and shows some of the beautiful sculptured columns, arches and pillars of the building.

The view within the press room is a marvelous sight. Here are to be seen a long row of magnificent steam printing presses of the very latest and most improved construction, mostly from the works of R. Hoe & Company, celebrated throughout the world for the excellence and reliability of their mechanism. Old printers regard with wonder the operations of these most remarkable machines, which print, join, fold, count and deliver perfected copies of the Herald at the astonishing aggregate rate of 288,000 eight page copies per hour

THE NEW YORK HERALD ESTABLISHMENT—A VIEW ALONG THE PRESS ROOM CORRIDOR.

Besides the above there is machinery for printing in colors, which has a capacity of 20,000 eight page Herald copies per hour.

The type or composing room of the Herald establishment occupies a large portion of the upper floor of the building, a space probably equal to 163 feet in length by 100 feet breadth. Here again an old printer would open his eyes in astonishment at the changes which a few recent years have made in the type work of a great daily newspaper. Instead of long lines of men standing before inclined cases and laboriously picking up the types, one by one, by hand, we now have rows of type-setting or rather type-making machines, before which the operators sit and play upon keys like a piano or a typewriter. Each touch makes a letter, which is impressed upon a thin strip of metal, forming what is called a linotype. In the Herald establishment between fifty and sixty of these wonderful machines are used.

Want of space prevents us from illustrating various other interesting departments of the Herald establishment, such as the matrix rooms, where the curved plates are made for use upon printing cylinders of the presses; the art department, where photo-engraved plates are produced, every prominent daily paper must now be illustrated with engravings; the steam engine department, which gives life and motion to all the various machinery; the vaults for the receipt and storage of paper, fuel and other supplies.

The Herald building is exclusively devoted to the purposes of the Herald newspaper, of which probably half a million copies are daily printed. No offices are rented, no other business is conducted within its domain. Probably the values of property here employed in the production of this wonderful newspaper amount to not less than two millions of dollars. Of this great establishment James Gordon Bennett, Esq., is the proprietor and director, and Mr. G. G. Howland the general manager.

In conclusion we may say that the Herald establishment is one of the most interesting and notable of all the famous objects to be seen and visited in this city.

THE NEW YORK HERALD ESTABLISHMENT—THE PRESS ROOM CORRIDOR.

Look Out for Old Oil Barrels.

It may be economy to use old oil barrels for other purposes, but great care must be taken, or an explosion may occur which will cause more damage than new barrels would cost. The importance of carefully cleaning old oil barrels before putting other substances in them is shown by an accident at the Westinghouse Electric Works, Brinton, Pa. Castings were stored in an old barrel, which had contained wood alcohol and been reheaded. One of the workmen lighted a match to see what was in the barrel, and the gas which had generated was exploded, throwing the castings in various directions, killing one man, wounding five others, and injuring the building.

Opaline Laminee.

A vitrified material, to which the name "opaline laminee" has been given, is made from silica 54 per cent, baryta 39 per cent, and soda 7 per cent. It is stated that the material can be made into plates of any required dimensions, and can be used for all purposes to which glazed tiles are commonly applied.

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The Cocaine Habit.*

The cocaine habit is a comparatively new addition to the evils by which humanity is beset, and it promises to excel even morphinism in the insidiousness of its growth, in blasting destructiveness and in the number of its victims. Under the influence of cocaine, the subject seems to enjoy a renewal of youth. Capacity for labor is augmented, and the need of sleep much diminished. The occasional use of cocaine leaves a highly illusive impression on the unprofessional mind, producing pleasant sensations, inspiring courage and causing a general feeling of exuberant vitality, with apparently no unpleasant after effects; but while the immediate action of cocaine is more animating and agreeable than that of morphine, it is not nearly so enduring, and the bitter sequelæ are manifested earlier and in a form far more disastrous than in morphine intoxication. Cocaine habitues are utterly unreliable and disregard all personal appearance, going about unkempt, bedraggled and forlorn. While under the influence of the drug they feel equal to any task, forget the past, cherish hopes for the future, are happy in and oblivious to their sad condition. Without it they are nervous, maniacal, morose and even dangerous. The cocaine habit is a swift road to destruction, and leaves in its wake a blight most terrible to behold.

The growing prevalence of this vice is largely due to the greatly reduced price of cocaine, occasioned by improvements in the process of extracting it from the crude drug. Less than ten years ago, cocaine was worth 75 cents a grain; it can now be bought at the rate of two grains for five cents.

Several distinct causes result in the acquirement of this habit. Prominent among these is the pernicious practice of a certain class of druggists (fortunately small in number) who offer cocaine when asked for something that will relieve toothache, neuralgia and countless other aches and pains. It is impossible to estimate the ruinous effect of such recklessness. To the chronic sufferer, cocaine proves at first an inestimable boon; but the first dose breeds an insatiable and almost insuperable appetite, and with this comes all the trickery and depravity of an experienced victim. Misery and the bitterness of remorse would fill the soul of the druggist who is so rashly indifferent as to incur this responsibility, had he sufficient imagination to see before him a panorama of the degradation, suffering and ruin for which he has become chargeable.

In some way the erroneous notion has come to prevail that, in treating the morphine habit, cocaine is of great value, counteracting the effects of the morphine. Proceeding on this principle, numberless quacks have claimed ability to cure the morphine habit. The unfortunates whom they have succeeded in deluding are perhaps cured of the morphine habit, but in its stead they become cursed with a vice far more ruinous than all their former ills. Cocaine may counteract the effects of morphine, but when the action of the cocaine is exhausted the system demands greatly increased quantities of morphine, and this in turn produces a desire for more and more cocaine. To use cocaine for curing the morphine habit is like jumping from the frying pan into the fire.

Another class of victims comprises those to whom cocaine has been administered in minor surgical operations, and who, remembering its exhilarating effects, subsequently obtain and use the drug to their ruin.

Some, ignorant of its possibilities for injury, begin this habit voluntarily; others are led into it by what seems to them a necessity; and others, again, are innocently beguiled into it by the influence of environment and friends.

The cocaine habit is apparently incurable, unless the subject possesses a powerful will and renounces the use of the drug ere its vicious effects are manifest. After the habit is once acquired, the system craves the drug very much as the body craves food. When this drug hunger is not gratified, the habitue suffers all the consequences of natural starvation, until his system recovers its normal condition. With overwork or any mental strain the craving for the drug returns, and is repelled only with the utmost difficulty. Each dose creates a demand for a larger dose the next time, and a point is seldom reached where a constant quantity produces uniform results.

A single instance will illustrate the terrible possibilities of this drug. A prosperous young lawyer, being very much overworked and in great demand, sought renewal of his exhausted energies in cocaine. For a long time this served him remarkably well, stimulating his energies and producing an appearance of renewed vitality. Presently his system failed to respond to the usual quantities of the drug; then began a gradual increase in the dose, with simultaneous reduction in the effect. Finally the drug seemed to lose all potency, and the subject was completely prostrated. Under skillful treatment he recovered after a time and appeared to be restored, but with returning labor and anxiety came the old craving and morbid desire for stimulus. This he resisted with all his energy, but to no avail. An extreme hunger prevailed in his system, and he could have no peace until this was satisfied. Notwithstanding his former experience, one night he stole from his home and satisfied his longing with cocaine. Pleasant thoughts and blissful dreams were the result. And thus he sustained himself from day to day. By stealth his wife obtained some of the drug, and, finding exhilaration in its use, continued to administer it to herself, guarding her secret from her husband. To-day one is a raving maniac and the other is behind the bars, clamorous for cocaine.

* Extracts from an article in Bulletin of Pharmacy, by Albert N. Doerschuk, Ph.G

An Aluminum Torpedo Boat.

About two years ago the Messrs. Yarrow, of London, were commissioned to build a small torpedo boat of aluminum, with a view to making a craft that should be very light, and thus be adapted to storage on the deck of a battle ship. The builders adopted an alloy of aluminum and 6 per cent of copper. The plates and frame of the boat were of this material shaped cold and were of medium hardness, of 14 to 16 tons per square inch of tensile strength. The portions subject to sea or bilge water were riveted with aluminum rivets, and the remaining parts, such as the deck, not subject to the action of sea or bilge water, were mostly riveted with soft iron rivets.

With reference to corrosion from sea water, Mr. Yarrow says, we have tried a series of experiments, extending over twelve months, and we find, provided there is no galvanic action due to other metals being in contact with the aluminum, the corrosion may be taken at under 4 per cent per annum for plates about ⅛ inch thick, the surface being unpainted. At the same time it must be borne in mind that such a boat as I am describing should be painted, and the paint used should be carefully selected, avoiding any that contains bodies which would have a direct chemical action on the plates. As further evidence of the effect of sea water upon aluminum, I would refer to the Vendenesse, a sailing yacht built of aluminum in Paris about eighteen months ago. The report of it as regards corrosion is as follows:

" . . . It has stood very well, excepting in a few places where copper fittings have been fixed in direct contact with the aluminum hull, which has produced a galvanic action. A similar action was produced when the boat was moored to a quay near another boat, the bottom of which was coppered, both being fastened to the same post by means of chains. With the above exceptions, direct contact with salt water has had no deteriorating effect."

The two great enemies to the use of aluminum are heat and alkalies. This material anneals at a comparatively low temperature, thus losing strength, while the alkalies act very rapidly upon it. Consequently any part likely to be subject to a considerable rise of temperature should not be made of aluminum, nor should it be used for a condenser where soda may be required for cleaning purposes. Aluminum at high temperatures oxidizes with exceptional rapidity. At low temperatures it does not oxidize so rapidly, and the film of oxide on the surface protects the metal from further action.

As regards the machinery of this little vessel there is nothing special to note, excepting that aluminum bronze and manganese bronze were used wherever practicable. No aluminum was employed except for the low pressure piston valve, for which purpose it seemed to answer well during the time the boat was in our hands. The engines were of the triple expansion type, and indicated on trial from 275 to 300 horse power. The boiler was of our usual type, with copper tubes.

Our contract with the French government was to construct a boat 60 feet in length by 9 feet 3 inches beam, which, with 3 tons load on board, should have a speed of 18¾ knots during a full speed trial of two hours, and which should not exceed 11 tons in weight, exclusive of the above load, The official trial took place on September 20, 1894, the average speed obtained during two hours, under the above conditions, being 20·558 knots. The boat was carefully weighed and found to be 10 tons. From this it will be seen that a speed of 1¾ knots beyond that contracted for was obtained, and the weight was 1 ton below the agreed maximum. In comparing this aluminum hull with one constructed of steel, the approximate saving in weight by adopting the lighter material cannot be taken at less than 2½ tons, which it must be admitted is a large percentage in a boat weighing, complete with its machinery, 10 tons. The machinery was found to weigh about 40 pounds per indicated horse power, including the water in the boiler and condenser. The vibration at all speeds was inappreciable. The French authorities are exceedingly pleased with the boat, and have in contemplation the building of several more, on the same plan, of aluminum.

A CEDAR tree 467 feet high and 70 feet in circumference at base has been felled near Ocosta, Washington. It is a pity that all such great giants of the forest, whose age is counted by centuries, cannot be preserved from destruction.

Infinitely Rapid Motions.

Lord Rayleigh, in lecturing upon the multitudinous motions of the waves of the sea, and the forces which govern them in their phases, as revealed by the researches of Stokes, Thomson, himself, and others, spoke of waves upon the surface of water too small and rapid to be seen by the eye. These, he explained, can only be made visible, and apparently slowed down so as to be appreciated, by means of instantaneous photography, or by a series of instantaneous optical projections. Each flash of light, such as that of the electric spark, makes the object appear to stand still for a moment in one of its phases, and the flashes must be so timed as to reveal each phase so that they blend slowly, and the whole appears to be moving so slowly that the nature of the motion can be seen. He projected an enlarged image of a vibrating tuning fork upon the screen, and its prongs appeared fuzzy from the rapidity of the motion, but when the projection was performed by properly timed flashes of light, he so slowed down the apparent motion that each prong appeared to make but one vibration in about two seconds, so that the nature of its motion could be seen with ease.

He then projected upon the screen the photographs he took three years ago of bursting soap films, each taken by the light of an electric flash lasting less than one-millionth of a second. The soap films were broken by means of letting a bullet, wetted with alcohol, fall through them; a dry bullet would go clean through them, perhaps, a dozen times without breaking them. The greatest difficulty in the work was in the mechanical arrangements, to so time the flash that it should occur just as the bullet had passed through the film. The photographs were good ones, showing the falling bullet, and the torn and thickened edges of the broken film, as well as some little attached filaments of liquid beads of soap solution.—Photography.

Military Lyceums.

With the approval of the Secretary of War the following orders have been issued by Lieut.-General Schofield:

There shall be established at every post in the army, garrisoned by troops of the line, an officers' lyceum, in which captains will form one class and lieutenants another; the instruction of these classes will be given separately. From the work connected therewith no officer of the line shall be excused excepting under such circumstances as would exempt him from any other duty at the post. The commanding officer of the post shall be president of the lyceum, and in that capacity act as director of instruction, subject to the supervision of the department commander. He shall be assisted by a secretary, from the officers of the garrison, whose duty shall be to keep a simple record of the proceedings of the lyceum. The secretary shall not be excused from the same duty that falls upon other members of the lyceum. The commanding officer shall also be assisted by such assistant instructors from officers of the garrison as may be approved by the department commander.

The president of the lyceum will prepare a carefully considered scheme of theoretical instruction, selected from the subjects enumerated in Paragraph I hereof, and assignments to courses of study will be made with special reference to the requirements of examinations for promotion.

Field officers and captains over fifty years of age will not be required to participate as members of the lyceum in this part of the work, excepting as it may be expedient to employ them as assistant instructors.

Grief from a Medical Standpoint.

The nervous system requires complete rest after blows caused by sorrow. Recent medical observations show that the physical results of depressing emotions are similar to those caused by bodily accidents, fatigue, chill, partial starvation, and loss of blood. Birds, moles, and dogs, which apparently died in consequence of capture, and from conditions that correspond in human beings to acute nostalgia and "broken heart," were examined after death as to the condition of their internal organs, and it was found that the nutrition of the tissues had been interfered with, and the substance proper of various vital organs had undergone the same kind of degeneration as that brought about by phosphorus or the germs of infectious disease. The poison of grief is more than a name. To urge work, study, travel, the vain search for amusements, is both useless and dangerous. For a time the whole organism is overthrown, and temporary seclusion is imperative for proper readjustment.

Grief cannot be ignored, neither can it be cheered up. It must be accepted and allowed to wear itself away. Readjustment comes slowly. Sorrow, grief, and all great misfortunes should be regarded as conditions similar to acute infectious diseases, which they resemble in result; and later, as convalescence from such diseases. Seclusion, rest, sleep, appropriate food, fresh air, sunshine, interests that tax neither mind nor body, these are requirements in this class of illness.—The Charlotte Medical Journal.

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RECENTLY PATENTED INVENTIONS.

Engineering.

BOILER.—Samuel P. Hedges, Greenport, N. Y. This boiler is designed for a stationary or marine boiler, which will not be top heavy, and in which the fire box is mainly composed of water tubes, and wherein other tubes affording circulation for water will be located immediately over the tubular fire box. The fire box tubes, etc., are arranged so as to permit of an even circulation and to permit of repairs being made with the minimum loss of time and money. The circulating pipes are so grouped that any one or more of the sections may be taken out into the fire room without disturbing any portion of the boiler, a blank header being introduced in its place, so that the boiler can be fired up at once and continued in use until the repairs are made in the section to be replaced. The fire tubes can all be reached from the fire box, taken out and others substituted, and the holes plugged with the tools ordinarily carried on steam vessels or usually at hand in the boiler room.

Mechanical.

HOSE REEL.—Clifton Giles Petherbridge, Rico, Col. The object of this invention is to provide a new and improved hose reel which shall be simple and durable and is arranged in such a manner that the hose is always attached to a water supply, and by unreeling the hose the water is automatically turned on, so that, in case of a fire, for instance, considerable valuable time may be saved. The inner end of the hose extends through the aperture in the reel, and connects with the vertical member of a T-pipe, which connects with the horizontal supply pipe. When the hose is unreeled, a valve mounted on the inner end of the horizontal supply pipe is opened, and the water flows through the vertical member of the T-pipe, which is coupled to the hose.

ROLLER COTTON GIN.—James Doig, Gainesville, Fla. The object of this invention is to remedy the defects in what is known as roller, sea island, or long staple gins. This is effected by reducing the number of parts by assembling what have hitherto been separate parts into groups, each part in a group being permanently fixed in its true position, relative to the other parts of the group, and the required elasticity or pressure is given by applying springs to each group as a whole, the groups being made adjustable to each other, whereby is obtained a gin having a wider field of usefulness, an improved quality of work and an increase of useful output, with less loss of time in adjusting and expense for repairs, and by which also the gin, while working, is brought under full control of the operator.

AXLE BOX.—Michael F. Deininger, Brooklyn, N. Y. This invention relates to axle boxes, and more particularly refers to improved means of lubricating the same. The device consists of an axle having an annular recess and longitudinal channels communicating therewith and of a cap to cover the recess and form an annular chamber. The cap is provided with an aperture through which a lubricant may be supplied. The axle box is provided with an interior recess adjacent to one of its ends. This end is adapted to engage a collar on the axle. The lubricant has access to the recesses in the axle and axle box and to the longitudinal channels of the axle.

FLOOR SANDPAPERING MACHINE.—John Mack, Newport, Ky. This invention relates to that class of machines which are used for smoothing and polishing floors. The object of this improvement is to produce a machine of this class which may be run either by hand or power, which has a convenient means for raising and turning its rollers so that it may be readily moved to one side, which has a revoluble sandpaper drum adapted to come into contact with the floor, which has a convenient means for fastening the sandpaper to the drum and which is provided with a fan to carry away the dust.

Railway Appliances.

SNOW PLOW.—Patrick Henry Craddock, Leadville, Col. This is an improvement upon the snow plow formerly patented by the same party, and the object of the present invention is to simplify the construction of the snow plow and to provide a means whereby the tread and flange face of the rails will be cleaned from ice adhering thereto simultaneously with the removal of the snow, and whereby also the weight of the plow will be held from off the track, thus permitting the engine to readily propel the plow forward or backward.

RAILWAY BLOCK SIGNAL LOCK AND REGISTER.—John Dean, New York City. This invention consists principally of a local lock for the signal, adapted to be unlocked from the next following station. In brief, it comprises a lock for the signal, a main lock circuit controlling the lock and operated from a distant point, a local lock circuit controlling the lock; the main circuit and the local lock circuit being provided with a movable portion, and a track circuit arranged in relation to the movable part, so that the latter will normally close the gap in the main lock circuit and enable the latter to be closed, and open the gap in the local lock circuit, the track circuit being also arranged in relation to passing trains as to cause a movement of the movable sections of the lock circuits which will open the gap in the main lock circuit so that this circuit cannot be closed, and close the gap in the local lock circuit.

CAR COUPLING.—Edward C. Inderlied, Rock Rift, N. Y. The object of this improvement is to provide a car coupling arranged to securely couple the cars and prevent accidental uncoupling, at the same time holding the non-engaged link of one of the cars in a proper resting position and without danger of interfering with the coupling parts. The invention consists principally of a drawbar, provided with a forward hook and a rear hook connected by an incline at its bottom with the bottom of its forward hook. The invention further consists of a drawbar, provided on its sides with inclined resting lugs adapted to support the link.

Miscellaneous.

REVERSIBLE GUTTER.—John Andy Freeze, Mason, Texas. The object of this new invention is to provide a reversible gutter which is comparatively simple and arranged in such a manner as to permit of conveniently cleaning and painting the same. The essential features of the invention are a reversible gutter comprising brackets and a channel adapted to be seated in the brackets and an arm pivoted on the said brackets and rigidly connected with the channels.

BOTTLE TOP.—Albert Wanner, Jr., Hoboken, N. J. This new invention relates to covers or caps for salt cellars, pepper boxes, etc. In this new bottle top, the top is a permanent fixture on the mouth of the bottle and is arranged to permit of filling the same with the desired substance and to form a perforated cap for the exit of the contents of the bottle in a divided state. It consists of a neck band having its upper end unbroken throughout its circumference and provided below said end with a lateral opening or slot, and perforated and imperforate plates pivoted at one edge and movable through the slot, independently into and out of register with the neck band, and provided with edge finger holds whereby either or both may be swung.

METAL FRAMED TRIPLE MIRROR.—Albert Wanner, Jr., Hoboken, N. J. In order to avoid excessive weight, the rectangular frames of triple mirrors are usually formed of light sheet metal struck into shape, the three similar frames being hinged together at adjacent side edges, thus leaving an objectionable gap between the mirrors when they are opened. It has been found that the heavy plate glass mirrors strain the hinges and parts of the frame to which they are attached, so that the three sections will not correctly fold nor all stand in a vertical position when so strained. The object of the present invention is to remedy these defects by an improved method of construction, thereby strengthening the triple mirror and closing the gaps between the mirrors.

WASHING MACHINE.—King E. Stoker, Logan, Utah Territory. The essential features of this washing machine are a curved slotted bed or false bottom and two independently swinging rubbers arranged side by side above it, and having semi-elliptical or half oval rubbing faces on their lower sides, and means for operating these rubbers whereby the portions of the rubbers on the same side of the axis are made to alternately approach and recede from the bottom in their reversed rubbing movements.

MACHINE FOR AFFIXING STAMPS.—Adolph Sanders, New York City. The object of this invention is to provide a machine for stamping letters, and is so constructed that the stamps may be placed in removable holders, so that holders for any denomination of stamps may be attached to the machine. The operation in brief is as follows: A letter is laid on the table, a moistening device moistens the surface upon which the stamp is to be affixed and recedes. Immediately thereafter a follower enters into engagement with the stamp receptacle, carrying the receptacle downward and forcing a stamp therefrom and pressing the same to a firm contact with the surface previously moistened, and thereby upon releasing the plunger the stamp receptacle and follower will be carried to their normal position. This entire operation is performed with one stroke of the plunger.

ANIMAL TRAP.—Estanislao Caballero de los Olivos, New York City. This new animal trap is provided with an opening for the entrance of the animal, an outlet through which the animal may be thrown out and an inclined belt arranged adjacent to the outlet and adapted to travel downward under the weight of the animal, to throw the latter into a suitable receptacle.

BILLIARD CUE CUTTER.—James B. Olney, New York City. The object of this invention is to provide a device which shall be simple, durable and capable of being operated with one hand, the cue being held in the other. A further object of the invention is to provide a billiard cue cutter with a stationary knife, so located in a holder that when the end of a cue is brought into contact with a knife and the holder or the cue is rotated, the said end of the cue will be trimmed expeditiously, smoothly and evenly.

ROASTER.—Norval H. McAuslan, Sutter City, Cal. The object of this new invention is to provide a roaster which shall be simple and durable in construction and is specially designed for use on ordinary stoves and ranges for roasting coffee or other articles. It is also arranged for the ready sampling of the article which is being roasted without stopping the machine and is devised to carry off the fumes arising from the roaster into the stove or range instead of allowing them to escape into the room. The principal feature of the invention is an exterior casing adapted to be placed on the stove and opening into the same at its bottom, and a drum provided with a damper adapted to open into the exterior casing to cause the fumes to pass through the casing into the stove. The sampling feature has been referred to above.

SASH HOLDER.—Joseph J. Kelley, Great Falls, Montana. This improvement relates to a simple form of sash holder which is peculiarly adapted for use on car windows, but which may be applied to any window sash. Sash weights may be dispensed with and the sash may be held at any desired height. The device consists of small wheels of elastic material mounted in proper casings on the window. These wheels are arranged to cause the sash to remain stationary in any position in which it may be left by friction against the casing. The wheels can be readily adjusted and are not likely to get out of order.

CLOTHES LINE.—Jesse G. Work, Redclyffe, Penn. This invention provides for a new and improved clothes line, which is arranged to securely suspend clothes without the use of pins, hooks or other separate devices, and is adapted to be conveniently drawn taut at any time. The wire clothes line is formed of sections that are pivotally connected and so constructed as to clamp the clothes and thus dispense with pins or other supplemental fastening devices. Any desired number of sections may be arranged between two posts.

DOOR FOR REFRIGERATORS.—Carl Sander, Brooklyn, N. Y. The object of this invention is to provide a means whereby the door of the refrigerating compartment when opened may be carried to a horizontal position and slid within the compartment, whereby the escape of the cold air from the ice compartment is prevented, thus reserving all of the cold air for service in refrigeration. The device also provides means whereby when the door is closed it will automatically adjust itself to form an air-tight connection with the wall of the opening it is adapted to cover. The door may also be easily removed from the body of the refrigerator for purposes of cleaning, repairs, etc.

TRIGONOMETRICAL CALCULATING AND MEASURING INSTRUMENT.—Adolphe L. Lacoste, Natchitoches, La. This invention relates to calculating and measuring instruments, and its object is to provide a new instrument which is comparatively simple and durable in construction, easily manipulated and is specially designed to enable surveyors and others to readily obtain the sine or cosine corresponding to a given distance and to a given angle without the aid of tables. The same device also forms a mechanical traverse table, giving for any angle and any distance the projections of the distance corresponding to the angle and also forms a mechanical table of natural sines and cosines. The results are obtained by the proper manipulation of scales and verniers which is rendered possible by the ingenious construction of the instrument.

CANOPY.—Milton T. Weston, Kenton, Ohio. This invention relates to an improvement in canopies, especially to a canopy adapted as a covering for a carousel or like machine, the object being to provide a canopy which may be supported without the aid of a center pole. The canopy comprises a center block to which the arms are secured at their inner higher ends to the block and are provided with eyes at their ends through which passes a rope which connects the various arms or ribs, a cover having a central opening for the pin in the block and secured around its margin to the rope. The canopy is supported by independent vertical posts provided at their upper end with pins extending removably through eyelets. These posts are attached to the ground or an adjacent support in the customary manner.

NOTE.—Copies of any of the above patents will be furnished by Munn & Co., for 25 cents each. Please send name of the patentee, title of invention, and date of this paper.

SCIENTIFIC AMERICAN BUILDING EDITION.

APRIL, 1895.—(No. 114.)

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1. An elegant plate in colors, showing a Colonial cottage recently completed for Frank L. Purdy, Esq., at Glen Ridge, N. J. Two perspective elevations and floor plans. An attractive design. Architect, Charles P. Baldwin, Esq., Newark, N. J.
2. Two perspective elevations and floor plans, showing a residence recently completed for George N. Tyner, Esq., at Holyoke, Mass. An elegant design in the Romanesque style of architecture. Mr. H. H. Gridley, Springfield, Mass., architect.
3. A cottage at Nutley, N. J., erected at a cost of about $4,000. Perspective elevation and floor plans. Architect, Mr. E. R. Silton, N. Y. A simple but tasteful design.
4. A Colonial residence at Orange, N. J., recently erected for John Hammond Bradshaw, M.D. A pure example of modern Colonial architecture. Two perspective elevations and floor plans. Messrs. Rossiter & Wright, New York City, N. Y., architects.
5. An attractive residence at Indiana, Pa., recently erected for Mr. Harry McCreary, at a cost of $4,350 complete. Perspective elevation and floor plans. Architect and builder, Mr. E. M. Lockard, Indiana, Pa.
6. Two perspective elevations and floor plans of a handsome residence erected for Samuel S. McClure, at Armour Villa Park, Bronxville, N. Y. A good example of a square rigged house. Cost $8,000 complete. Mr. Henry S. Rapelyea, architect, Mount Vernon, New York.
7. A cottage at Glen Ridge, N. J. An attractive residence in the Elizabethan style. Two perspective elevations and floor plans.
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9. An elegant residence at Flatbush, L. I., recently erected at a cost of $11,000 complete. Two perspective elevations and floor plans. Architect, J. G. Richardson, Esq.; builder, J. C. Sawkins, Esq., both of Flatbush, L. I. An attractive design.
10. A house at Park Hill, N. Y., recently erected for Messrs. Loreni & Morrow, at a cost of $6,500 complete. Perspective elevation and floor plans. Mr. Edmund J. Maurer, architect, New York.
11. Miscellaneous Contents: Moderne Innen-Decoration.—The evolution of an old building, with 4 views.—Wood stains.—Wood finish chemically and microscopically examined.—A tubular frame house.—To destroy hothouse insects.—Venetian blinds, illustrated.—An improved spring hinge, illustrated.—Cement mortar.—A blind architect.—Frozen water closets.—An electrical mail box, illustrated.—The anchor fence post, illustrated.—Hardwood matching heads, illustrated.—Porcelite.—The Rider engines, illustrated.—The Security sash balance, illustrated.—Improved woodworking machinery, illustrated.

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NEW BOOKS AND PUBLICATIONS.

THE SLIDE RULE. A practical manual. By Charles N. Pickworth. Manchester and London: Emmott & Company, Limited. Pp. 56. Price 80 cents. No index.

There is always something attractive in what may be termed the gymnastics of the slide rule, and the 56 pages of this little work contain an excellent resume, with practical examples, of what can be done by this instrument of the engineering shop.

A STANDARD DICTIONARY OF THE ENGLISH LANGUAGE. Prepared by more than two hundred specialists and other scholars, under the supervision of Isaac K. Funk, D.D., Editor-in-Chief; Francis A. March, LL.D., L.H.D., Consulting Editor; Daniel S. Gregory, D.D., Managing Editor; Associate Editors Arthur E. Bostwick, Ph.D., John Denison Champlin, M.A., Rossiter Johnson, Ph.D., LL.D. New York, London, and Toronto: Funk & Wagnalls Company. 1893. Printed in the United States. 2 vols. Pp. xx. 2318.

The announcement in these columns that space does not permit us to do justice to some book which is under review has become perhaps too familiar to our readers. But when we find ourselves confronted with such a mass of erudition and labor as is represented by the two volumes of the Standard Dictionary, the old excuse must be brought forward again. The work is a monument to the enterprise of the publishers and to the judgment of the editors. The editorial function seems to have been carried out with unusual judgment both as regards omissions and classification. The treatment of words of two or more meanings is uniform, the most common meaning being always given first, while the extinct meanings are given last. The compactness of arrangement is secured by system. Thus under such words as apple, colors, etc., long lists are given, often of a hundred or more different terms coming under this head. The particular list under apple still further exemplifies the admirable system of the work. After each name of a variety is given in columns its size, form, color, quality, use, season, and ratings of adaptation for cultivation in the Northern, Central, and Southern divisions of the United States. Some three hundred varieties are in the table, and for each one the nine specific data specified are given. This one table contains therefore nearly three thousand separate data relating to apples. Many similar instances could be cited, but this will suffice to illustrate the methods. The list of specialists engaged as editors is a formidable one, nearly two hundred of such figuring on the staff. The tendency of the day is in the direction of cyclopedic dictionaries, and the Standard is as much of a cyclopedia as it is of a dictionary. Many of our readers remember the stir made by the introduction of illustrations in the old Webster unabridged. The Standard is finely illustrated, not only with cuts, but with a number of beautiful colored plates. Beautiful examples of the latter are used to elucidate familiar flowering plants (under the word "PLANTS") or gems and precious stones (under the word "GEMS"). We are strongly tempted to continue, but will stop here, leaving to the users of the book the appreciation of its extraordinary merits and value. The two volumes are easily handled and fitted for every day use. They are provided with thumb notches for the letters, so that any letter can at once be turned to. The list of editors, each for his own department, enables the consultor to feel the weight of authority for each specific word. The appendices of disputed pronunciations and spellings and other more or less extraneous matter are of the highest value and interest. The list of foreign words and phrases is excellent. "Deus ex machina" (II, 3255) is an illustration of the treatment. "Obra de comun, obra de ninguun" (II, 2260) is an instance of faulty spelling. As a suggestion of an omission, "Lucus a non lucendo" might be given.

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Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information and not for publication.

References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.

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Minerals sent for examination should be distinctly marked or labeled.

(6504) A. A. B. says: Please inform me through your columns how to make a liquid to transfer photographs or printed matter from paper on glass. A. Any picture, print or even clipping from newspapers, any engraving, no matter in how many colors, or on what kind of paper, may be transferred to glass, says a contemporary, only the treatment of the different kinds of paper differs. Place the object to be transferred, face downward, upon a larger sheet of manila paper; prepare a solution of from one to three per cent of nitric acid in water, according to thickness and strength of paper and how strong it was sized; ordinary newspapers and printings or engravings on unsized glaze paper require even less than one per cent nitric acid. One of the purposes of adding nitric acid is to remove the sizing out of the paper. Apply this solution with a sponge to the back of your object to be transferred; be careful not to overdo it; you only want to render the paper soft but not wet. Continue sponging with this solution until you see the printing plainly; that is, until the paper becomes transparent. Clean the glass plate thoroughly with alcohol by means of a ball of clean cotton; dry it off well; wash it with turpentine; dry it off again; place the glass plate upon a smooth elastic layer—for instance flannel—and with this elastic layer upon a table, or better yet, upon a rubber blanket in the litho hand press. Now coat the cleaned surface with a thin coat of half turpentine and half dammar varnish; let it dry from ten minutes to one day, according to temperature and thickness of dammar varnish. The coating should not be allowed to dry entirely; it should be a trifle adhesive. Lay your impression face downward upon the glass plate; it is important that neither acid nor water touches the surface during the entire process. To properly lay down the impression, take it up with both hands by holding the left hand under corner and the right hand upper corner; be careful not to get any air bubbles under the sheet. This is best accomplished by marking upon the plate the exact position and size of the sheet. Laying down the paper first, adjust the right hand upper corner to the mark on the plate, hold it there with the tip of your finger and adjust the left hand lower corner, but be careful to avoid air bubbles. Press the sheet to the adhesive dammar coat. This may be done in many different manners. It does not require a very strong pressure, but it should be observed that each and every spot has to be pressed repeatedly against the plate. When the paper sticks quite smoothly to the plate, fan it perfectly dry, and then with wet finger tips slowly rub off the paper. If this is done with great care, you will remove every vestige of paper, and the print, of whatever color or nature it may be, will remain on the glass plate. Upon this apply another coat of dammar varnish containing very little turpentine. With too much turpentine, you run the risk of washing the entire picture from the plate again.

(6505) C. S. asks: 1. Fully describe the common return system of telephone wiring for exchange purposes. A. For telephone exchange connections we refer you to the SCIENTIFIC AMERICAN, No. 13, vol. 60, No. 22, vol. 67, and SUPPLEMENT, Nos. 772, 733, 413, 998, 1004. 2. What would be the effect if each plate of a storage battery were inclosed in a porous clay envelope, like carbon in porous cup of open circuit batteries? A. It would increase the resistance without any compensating advantage. 3. If ampere capacity of plates of a storage cell is 6 amperes, would a flow of 1 ampere for 6 hours exhaust it? A. Divide the ampere hours by ten to get the working current. "Ampere capacity" should mean the working current.

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April 23, 1895,

AND EACH BEARING THAT DATE.

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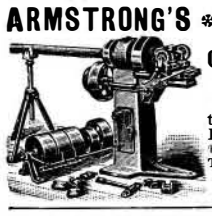

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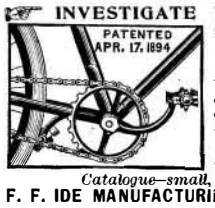

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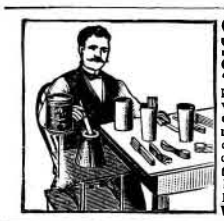

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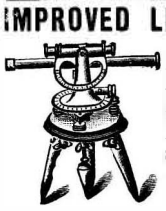

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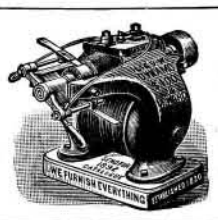

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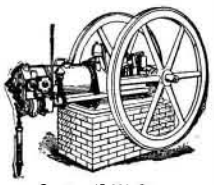

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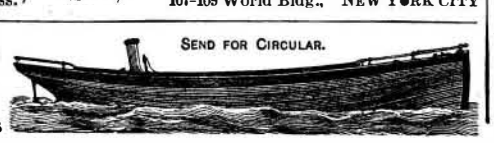

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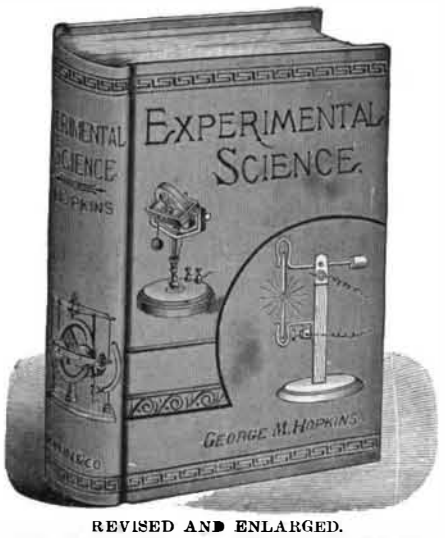

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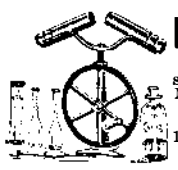

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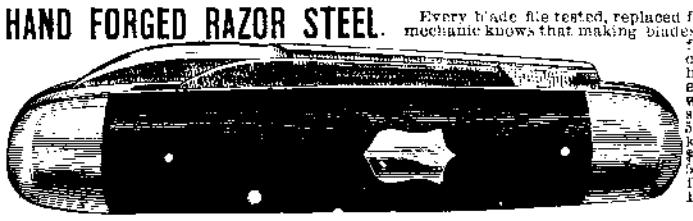

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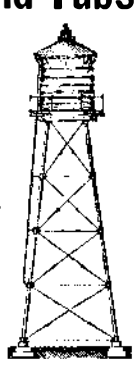

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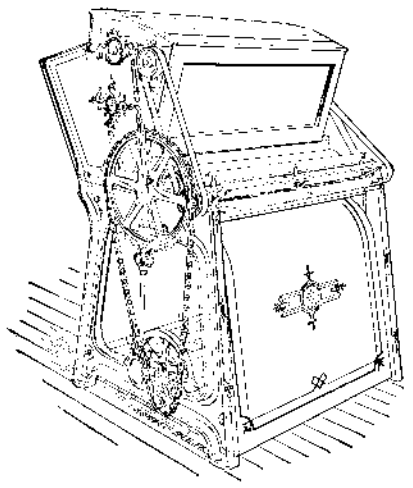

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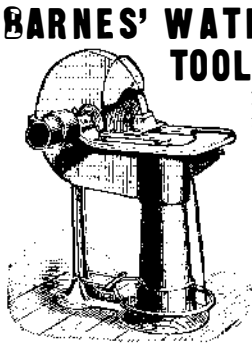

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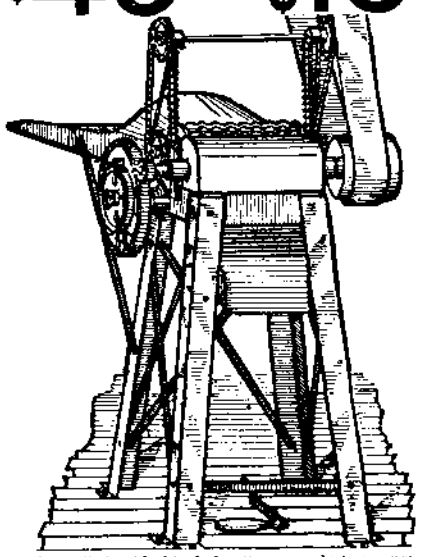

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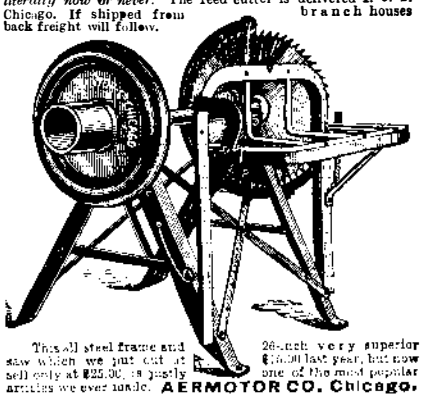

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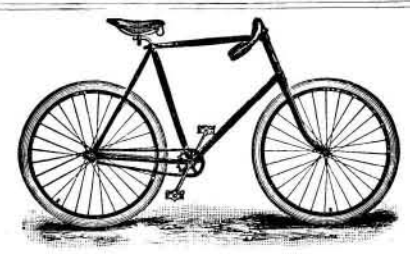

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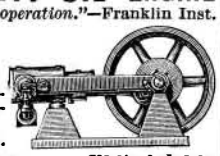
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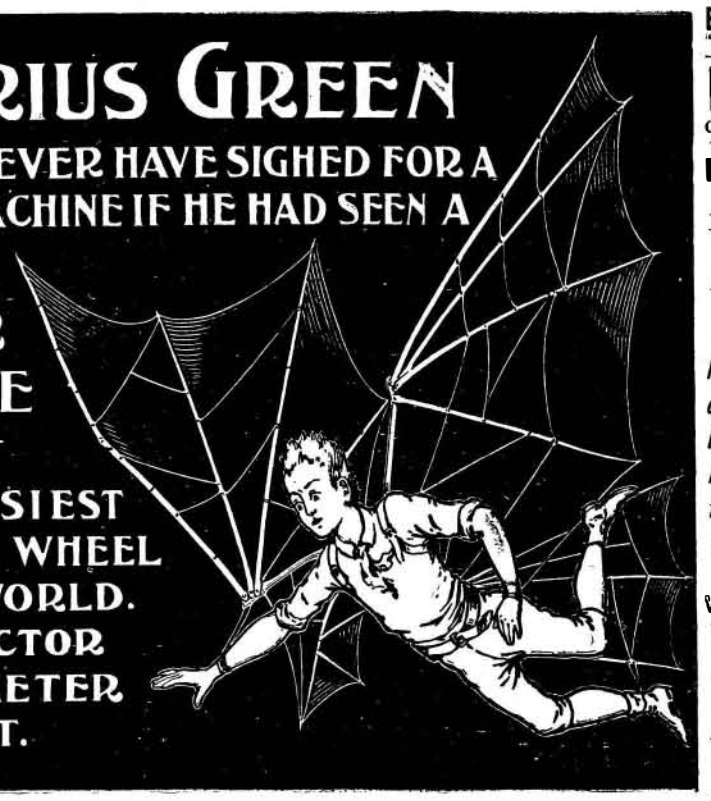
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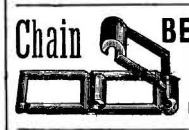
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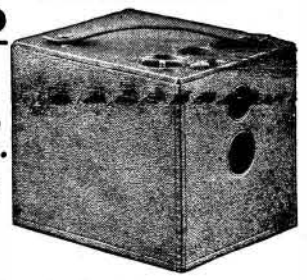
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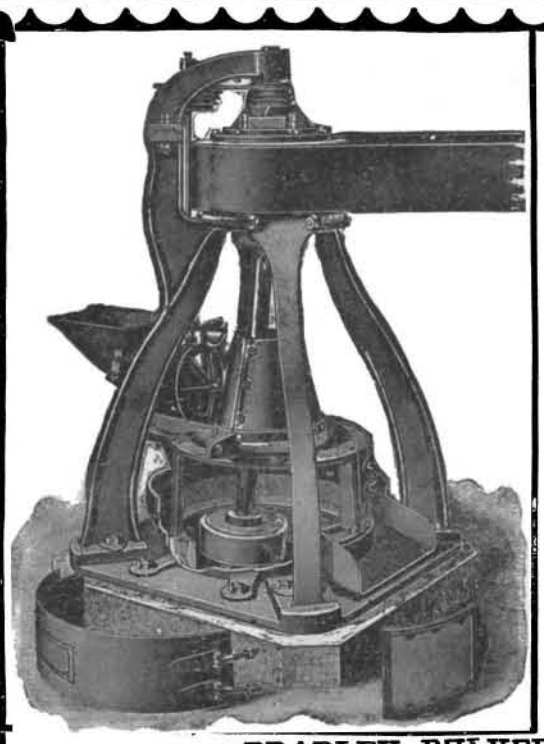
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